

091288

MAGNETIC FIELD HOURLY AVERAGES
FROM THE ROME-GSFC EXPERIMENT
ABOARD HELIOS 1 AND HELIOS 2

F. Mariani, N.F. Ness, B. Bavassano, R. Bruno,
R. Buccellato, L.F. Burlaga, S. Cantarano,
C.S. Searce, R. Terenzi, U. Villante

IFSI-87-1

January 1987

RECEIVED BY

ESA - SDS

14 SET. 1987

DATE

DCAF NO.

320100

PROCESSED BY

☒ NASA STI FACILITY

☒ ESA - SDS ☒ AIM

(NASA-TM-89782) MAGNETIC FIELD HOURLY
AVERAGES FROM THE ROME-GSFC EXPERIMENT
ABOARD HELIOS 1 AND HELIO 2 (NASA) 139 p

CSSL 03B

N88-21995

Unclas

G6/92 0113574

ISTITUTO
DI FISICA DELLO SPAZIO INTERPLANETARIO
CONSIGLIO NAZIONALE DELLE RICERCHE
VIA G. GALILEI — 00044 FRASCATI (ITALIA)

MAGNETIC FIELD HOURLY AVERAGES FROM THE ROME-GSFC EXPERIMENT
ABOARD HELIOS 1 AND HELIOS 2

F. Mariani (1), N.F. Ness (2), B. Bavassano (3), R. Bruno (3),
R. Buccellato (3), L.F. Burlaga (2), S. Cantarano (1),
C.S. Searce (2), R. Terenzi (3), U. Villante (4).

- 1) Dipartimento di Fisica, II Università, 00173 Roma, Italy
- 2) Laboratory for Extraterrestrial Physics, NASA/GSFC, ✓
Greenbelt, Maryland 20771, USA
- 3) Istituto di Fisica dello Spazio Interplanetario, CNR,
00044 Frascati, Italy
- 4) Dipartimento di Fisica, Università, 67100 L'Aquila, Italy

In this report we present the complete set of hourly averages of the magnetic field measured by the Rome-GSFC experiment on Helios 1 and Helios 2.

A general description of the Helios mission, designed to investigate the innermost region of the solar system, has been given by Porsche (1977). Here we recall only that Helios 1 and Helios 2 were launched on December 10, 1974 and January 15, 1976, respectively. Their orbits were highly eccentric to allow small perihelion distances. For Helios 1 the aphelion, perihelion, and period were 0.985 AU, 0.309 AU, and 190 days, while for Helios 2 they were 0.983 AU, 0.290 AU, and 187 days, respectively.

A description of the Rome-GSFC experiment is found in Scarce et al. (1975). Details on data analysis are given by Bavassano (1976, 1978), and Villante and Mariani (1977). The instrument basically consists of a triaxial fluxgate magnetometer. The optimum range of measurement is selected among four different ranges either by an automatic switch or by telecommand. A thermally oscillating actuator is used to reorient the sensor by 90 degrees to evaluate the zero level of all three axes. The experiment has two different modes of operation, the detailed mode and the average mode, depending upon the telemetry bit rate. At high rates the detailed mode is used: each measurement is stored and transmitted without any data processing, the time resolution varies from 0.07 to 1.5 seconds. At low rates the average mode is used: individual measurements are processed by an on-board computer and average values transmitted with a time

resolution from 3 to 48 seconds.

Plots of all the hourly averages computed from the magnetic field measurements obtained during the mission are given in this report, separately for Helios 1 and Helios 2. The magnitude and the direction of the averaged field are plotted versus the number of solar rotations as seen from Helios, counted from launch. Each plot refers to one solar rotation. Its time duration is strongly affected by the variation of the angular velocity of the spacecraft along the orbit. As an indication, the solar rotation lasts about 27 days at the aphelion and about 40 days at the perihelion. In each plot the bottom panel refers to the field magnitude (in nanotesla), the central panel to the solar-ecliptic latitude THETA (inclination to the ecliptic plane, positive northward, in degrees), the top panel to the solar-ecliptic longitude PHI (azimuth on the ecliptic plane, zero toward the sun and counted counterclockwise as viewed from north, in degrees). At the bottom of each plot we indicate, every three days, the heliocentric distance (in AU), the heliographic latitude (in degrees), and the ecliptical longitude (in degrees, counted from the Sun-Earth line) of the spacecraft. The ecliptical latitude is very small, everywhere less than 0.03 degrees. The days indicated along the axis are days of year (1=January 1st). At the left lower corner the solar rotation number, referred to Helios, is given. At the top of each plot (just below the heading) the upper line of the upper panel is drawn double when the corresponding data were taken with the experiment in the average mode of

eration.

We give also a series of plots with the orbits of the two spacecraft. The first of these plots shows an ecliptic projection of the orbits of the two Helios and of the innermost planets. The scale around the sun-centered circle indicates heliographic latitude within the ecliptic. Both spacecraft are south of the solar equator when to the right of the solar equatorial node line, and north when to the left. In the other plots ecliptic projections of the Helios orbit referred to the Sun-Earth line are given for all the time interval covered by the magnetic data. Tick marks along the trajectory indicate the spacecraft position at intervals of ten days.

References

Bavassano, B., Magnetic field data analysis for the Rome-GSFC experiment onboard Helios A and B, Report LPS-76-18, Laboratorio Plasma Spazio (C.N.R.), Frascati, Italy, 1976.

Bavassano, B., Helios magnetic data analysis: an updated description of the output data tapes, Report LPS-78-9, Laboratorio Plasma Spazio (C.N.R.), Frascati, Italy, 1978.

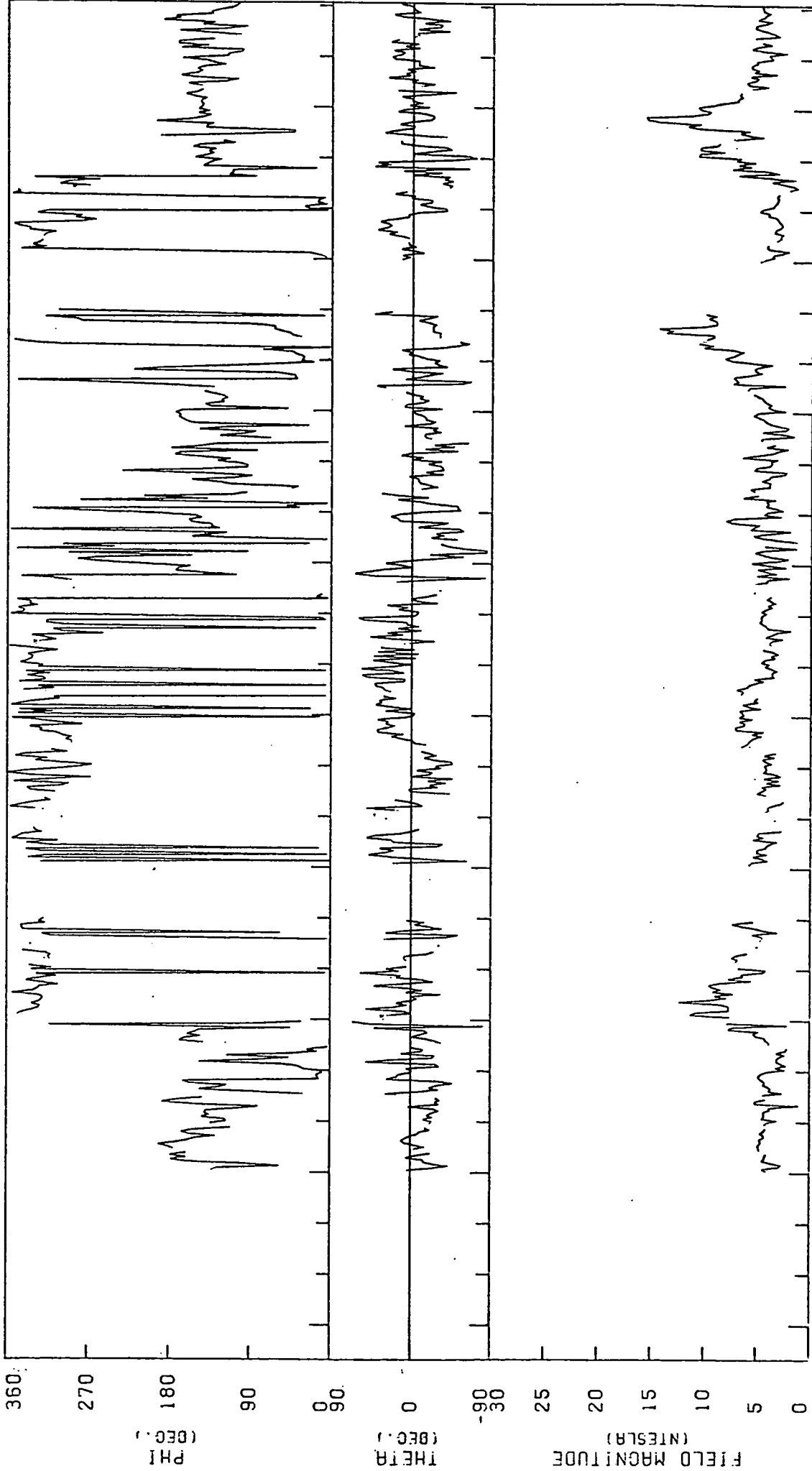
Porsche, H., General aspects of the mission Helios 1 and 2, J. Geophys., 42, 551, 1977.

Scearce, S.C., S. Cantarano, N.F. Ness, F. Mariani, R. Terenzi, and L.F. Burlaga, Rome-GSFC magnetic field experiment for Helios A and B, Report NASA-GSFC X-692-75-112, 1975.

Villante, U., and F. Mariani, On the determination of the zero level parameters for a triaxial fluxgate magnetometer on Helios 1 and 2 spacecraft, Report LPS-77-23, Laboratorio Plasma Spazio (C.N.R.), Frascati, Italy, 1977.

YEAR 1974

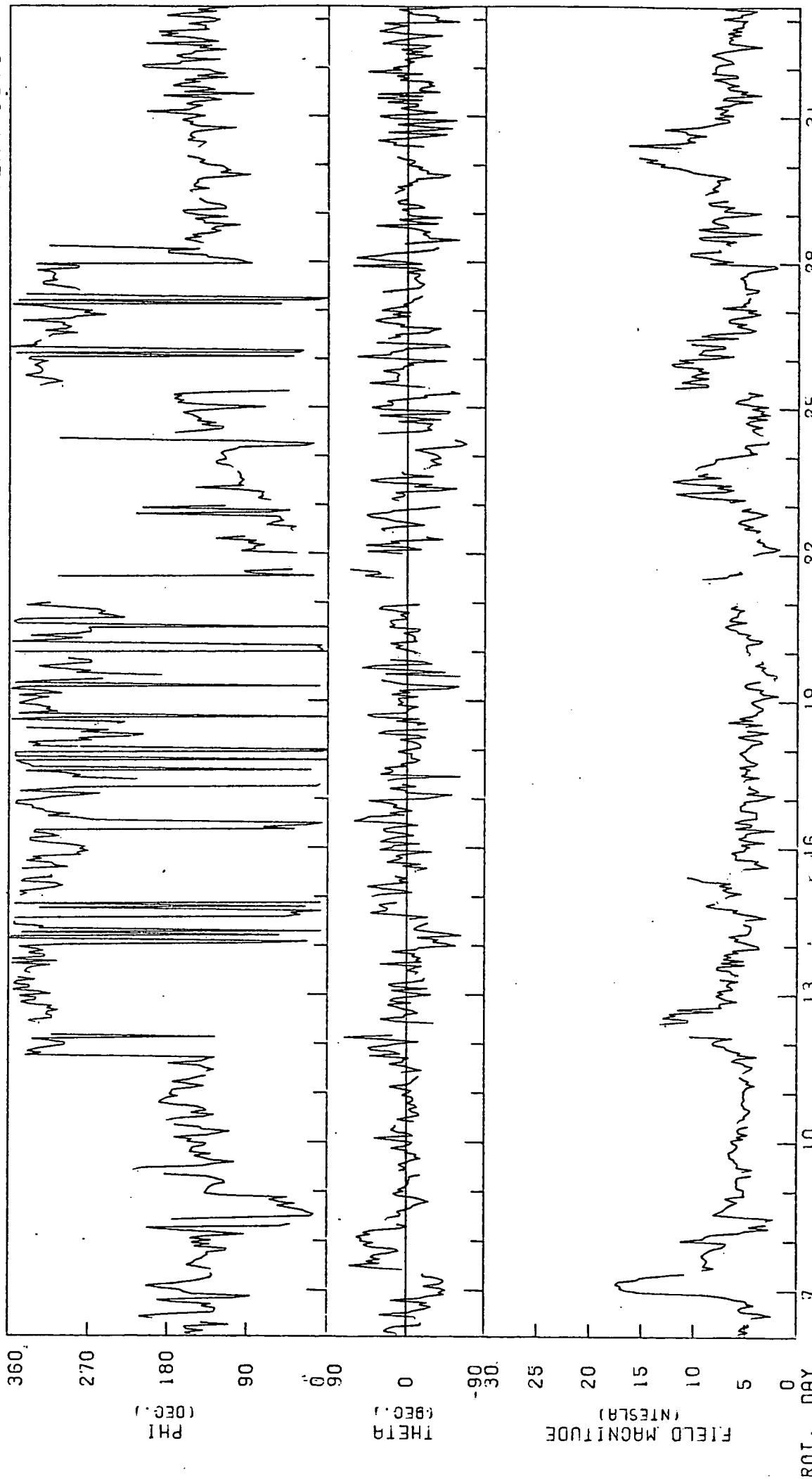
HELIOS 1 EXP 3 (HOURLY AVERAGES)



ROT.	0	1	4
DAY.	345	363	.936
DIST.	.985	.957	-2.5
LAT.	-.4	-2.2	352.7
LONG.	359.8	353.4	

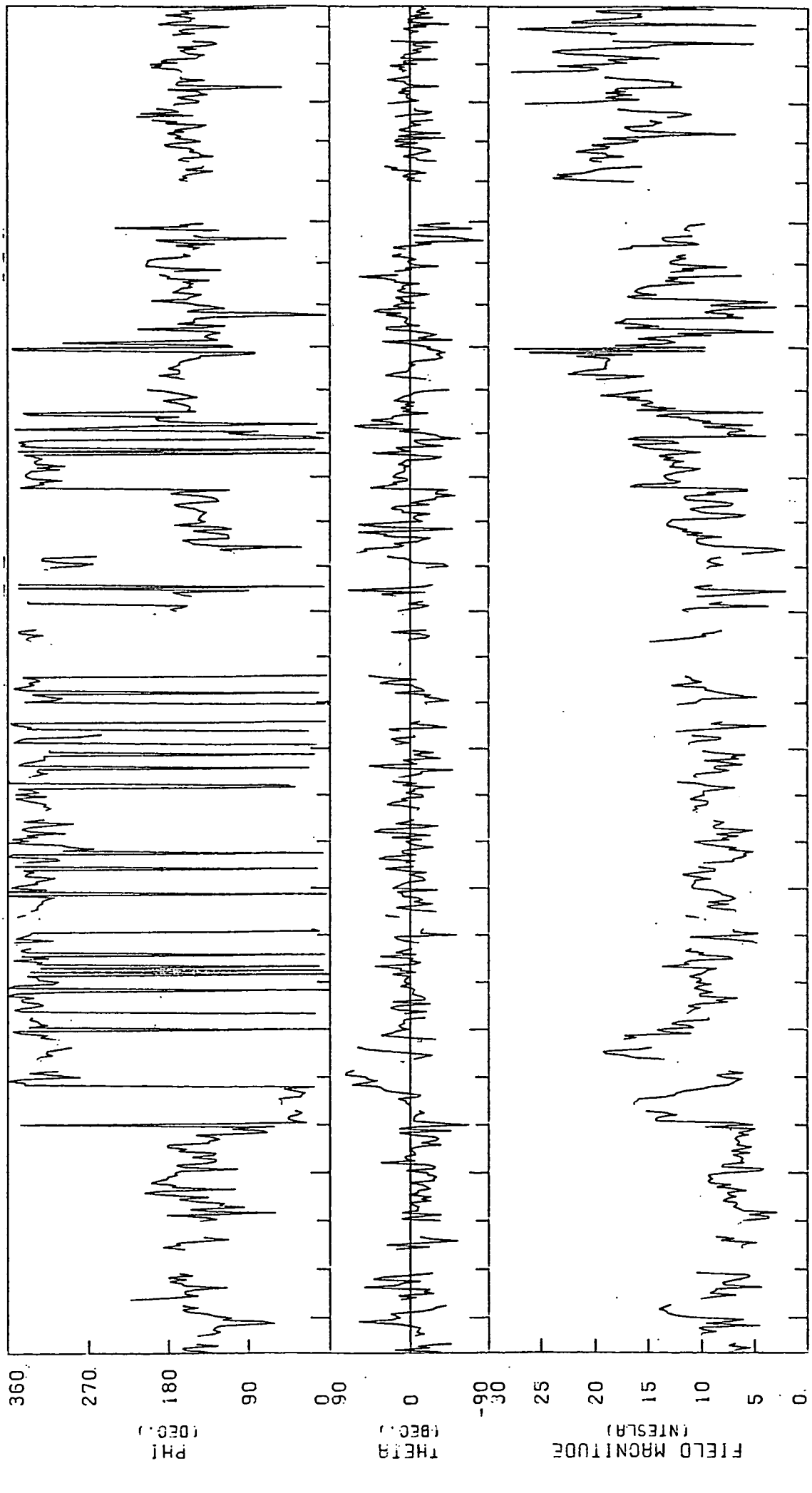
HELIOS 1 EXP 3 (HOURLY AVERAGES)

YEAR 1975



YEAR 1975

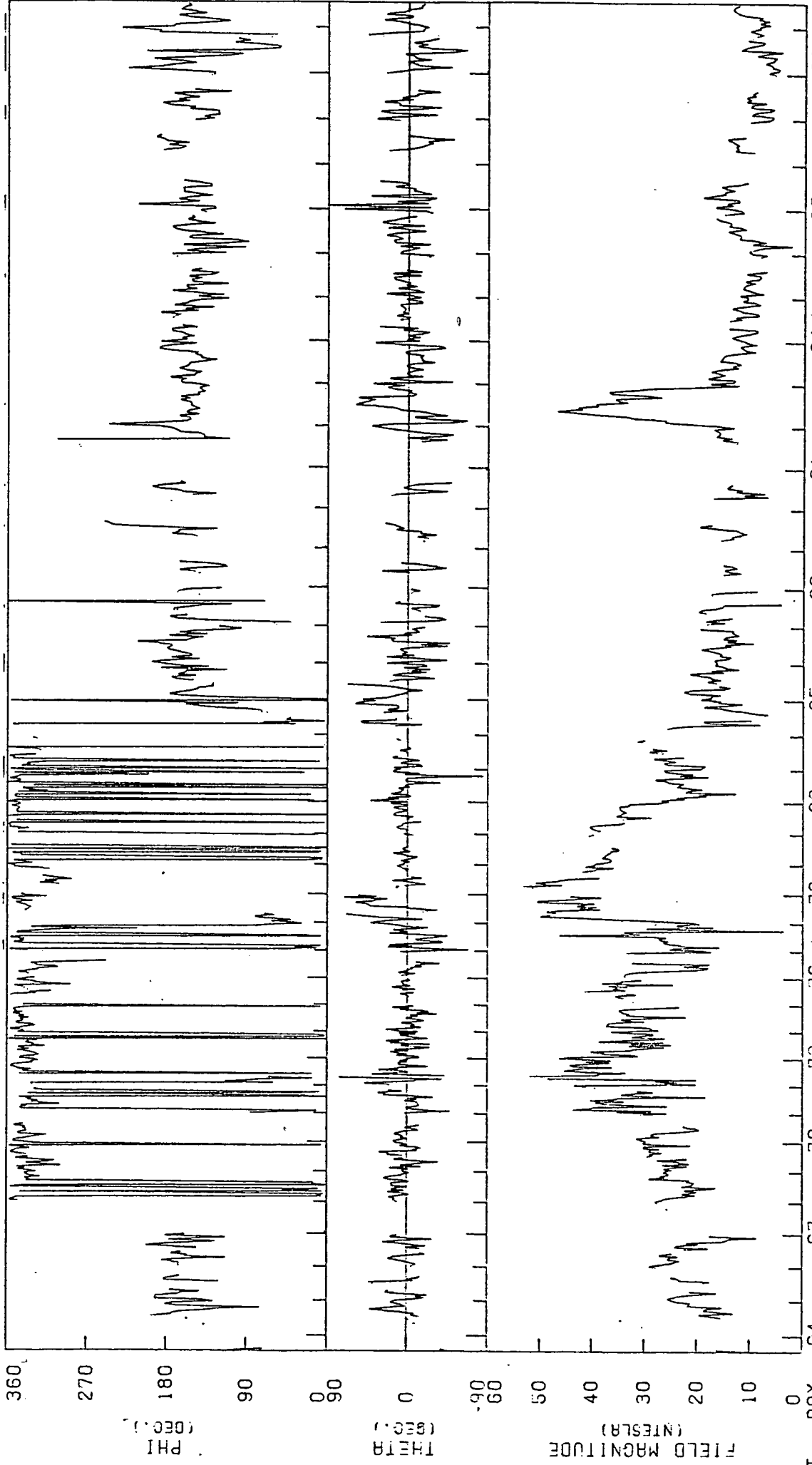
HELIOS 1 EXP 3 (HOURLY AVERAGES)

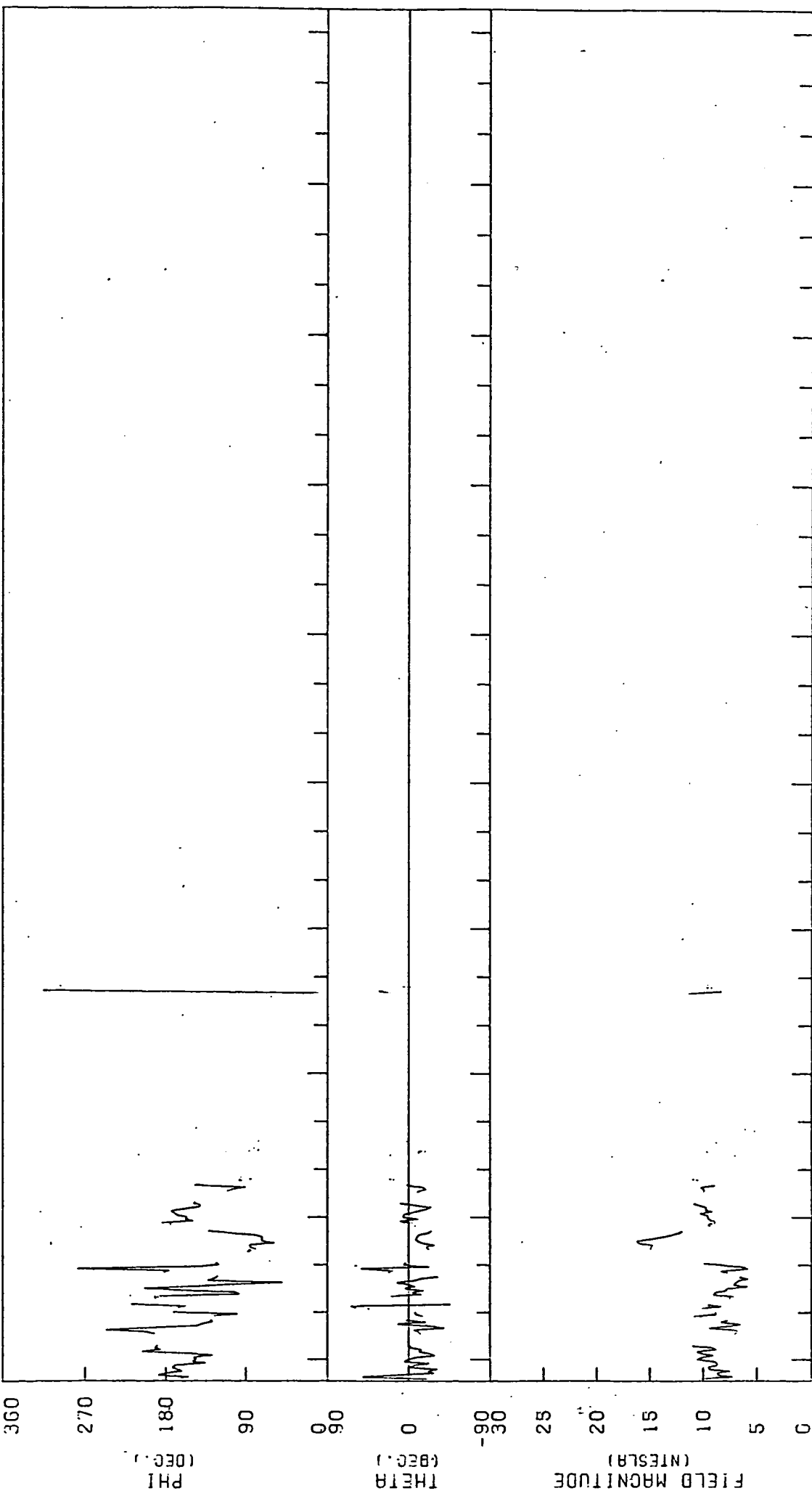


ROT.	DAY.	34	37	40	43	46	49	52	55	58	61
2.0	DIST.	.736	.707	.676	.643	.609	.572	.535	.496	.457	.418
TO	LAT.	-5.4	-5.7	-6.1	-6.4	-6.6	-6.9	-7.1	-7.2	-7.4	-6.9
3.0	LONG.	350.7	351.5	352.7	354.3	356.5	359.3	2.9	7.5	13.4	21.0

HELIOS. 1 EXP 3 (HOURLY AVERAGES)

YEAR 1975

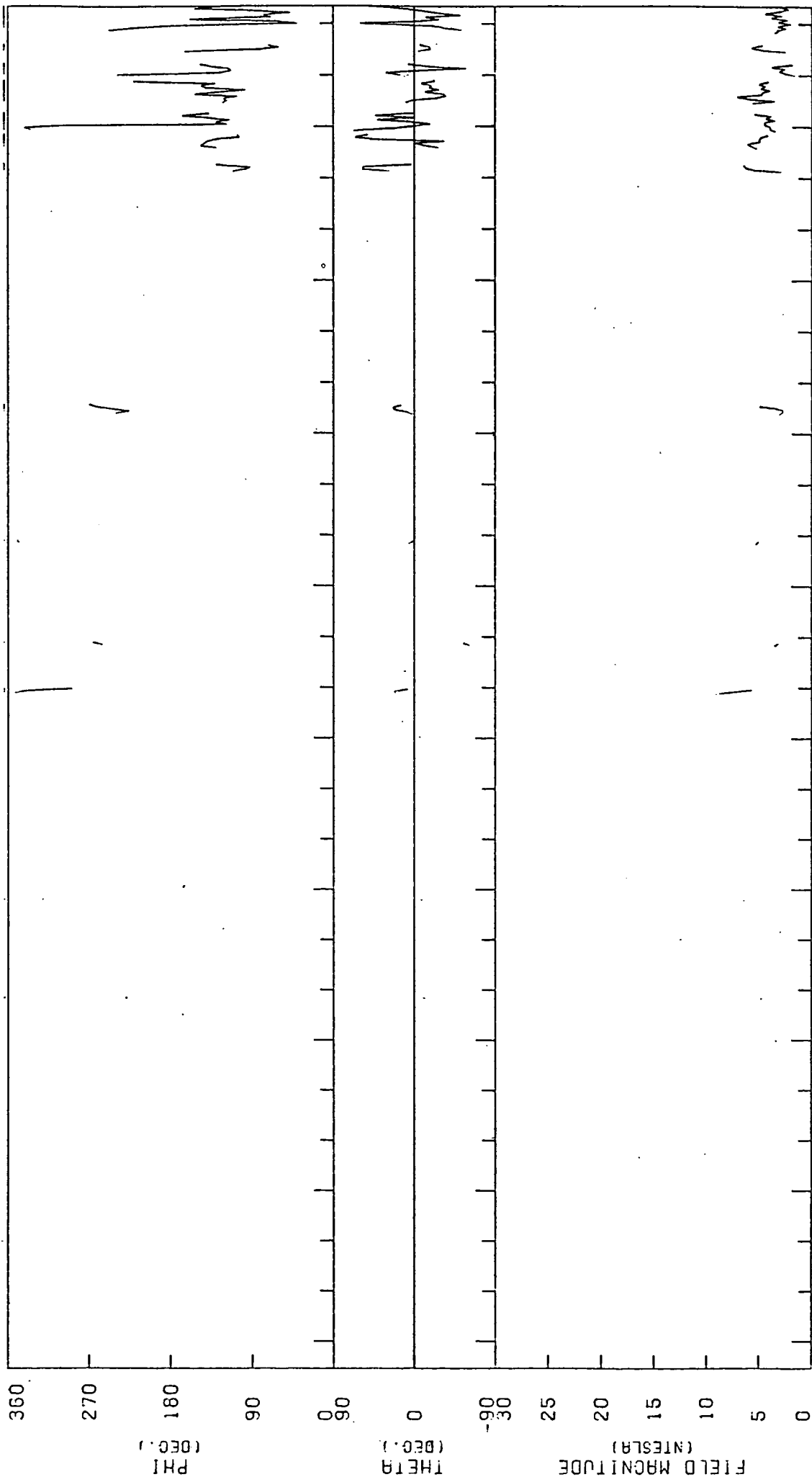




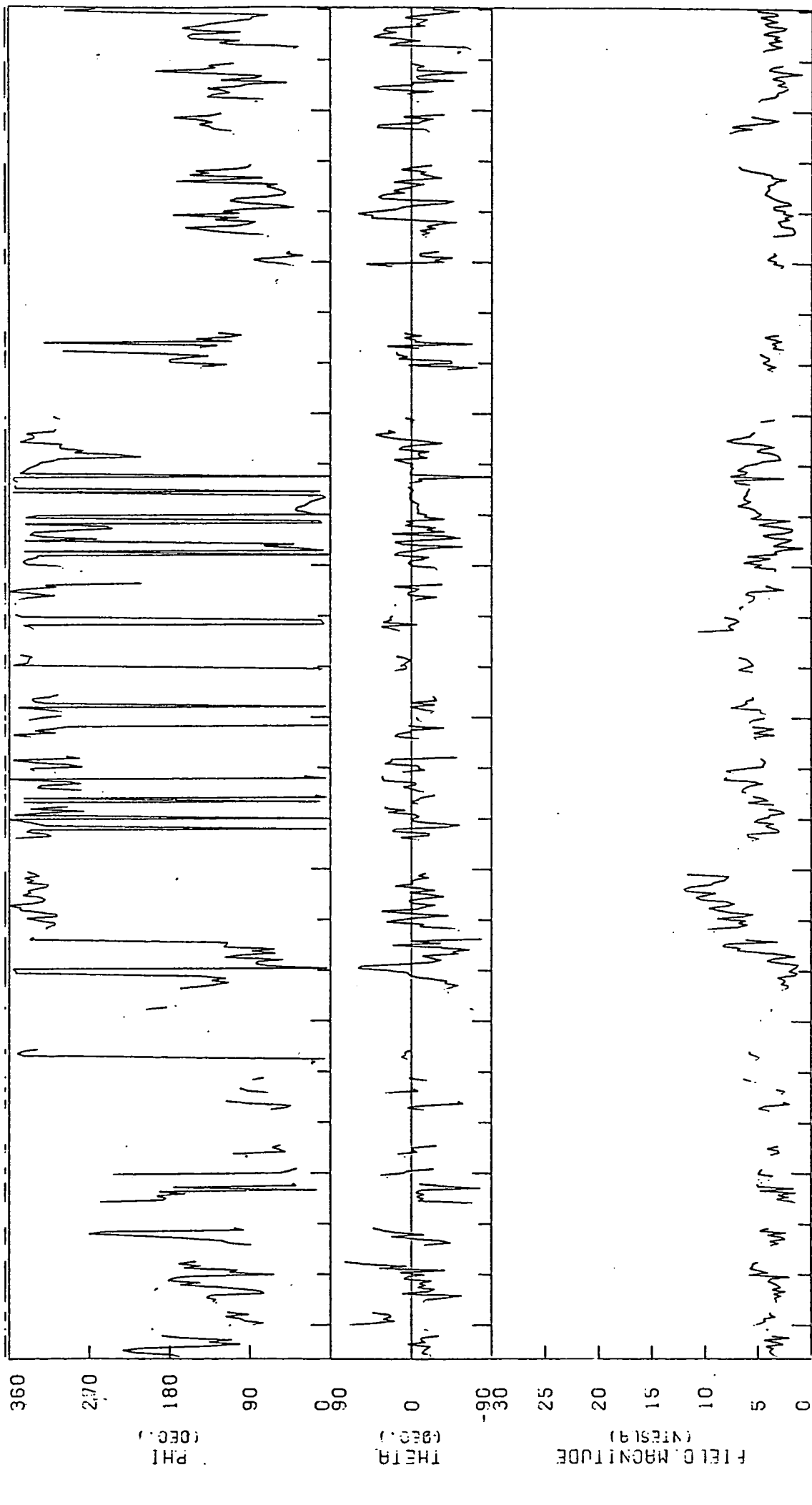
ROT. DAY	102	105	108	111	114	117	120	123	126	129
4.0	5.99	6.34	6.68	6.99	7.29	7.57	7.83	8.07	8.30	8.51
TO	6.4	6.1	5.8	5.4	5.1	4.8	4.4	4.1	3.8	3.4
LONG.	170.6	173.0	174.9	176.3	177.4	178.1	178.6	178.9	179.0	179.0

HELIOS. 1 EXP 3 (HOURLY AVERAGES)

YEAR 1975



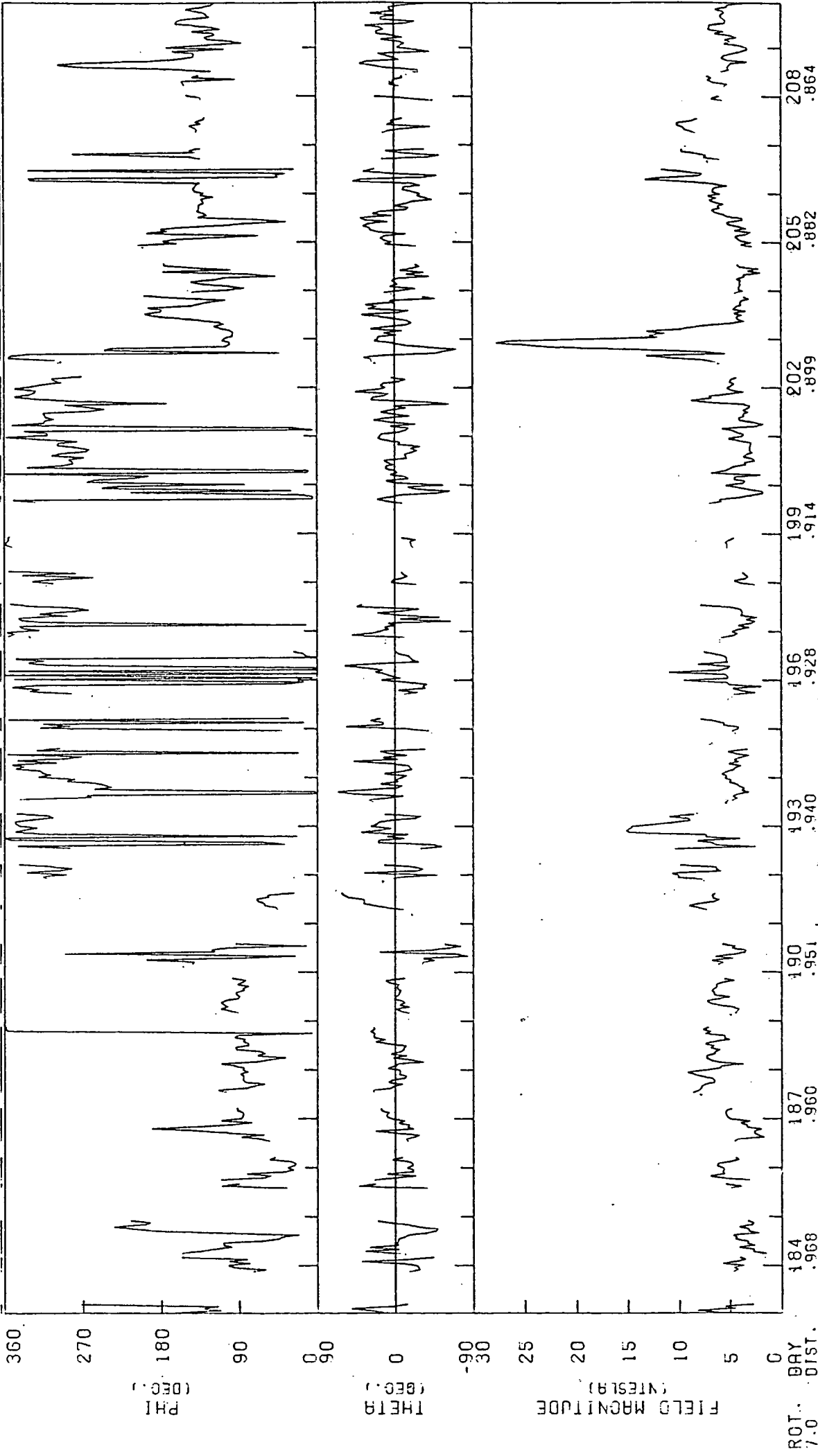
ROT. DAY
DIST

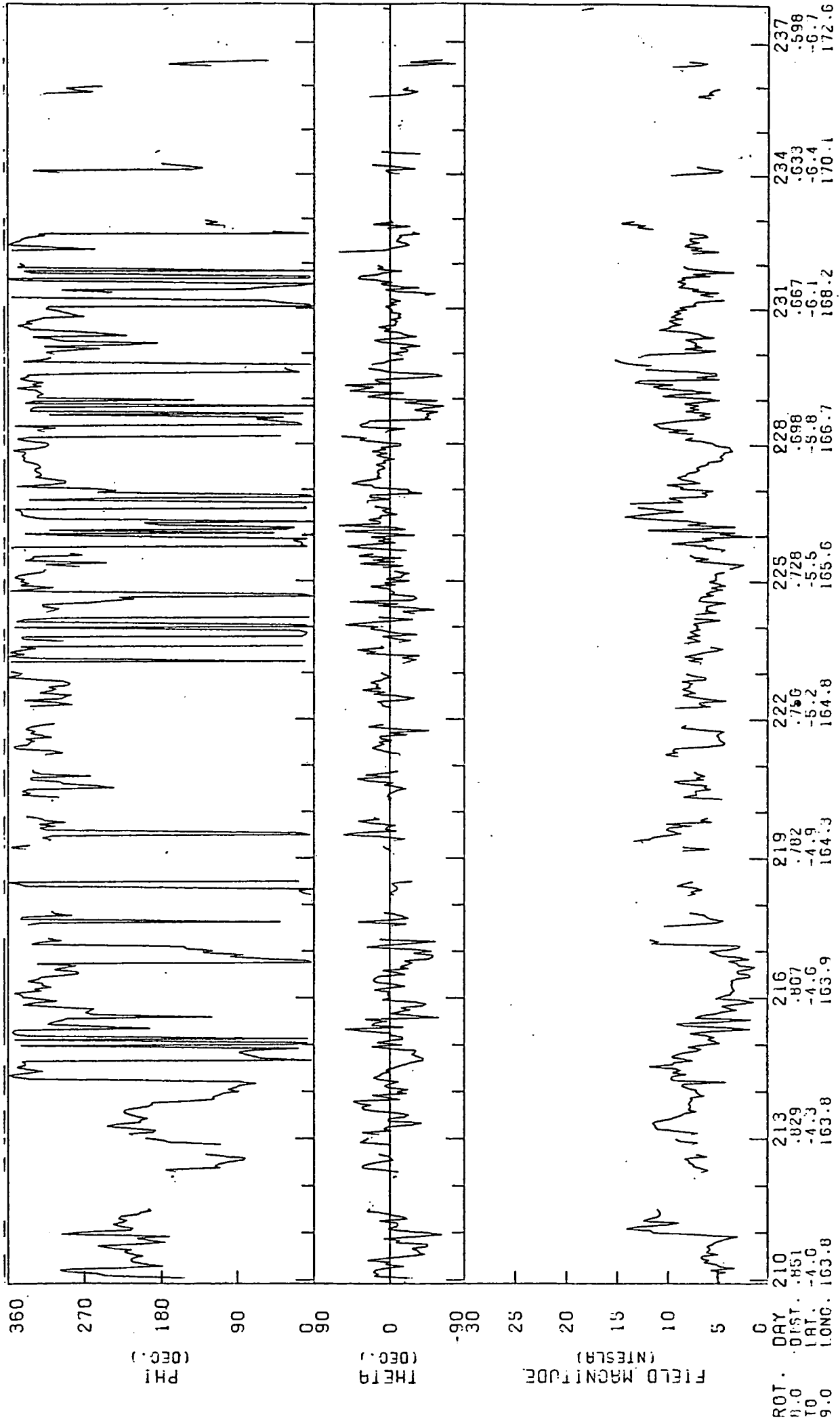


ROT. C.C.	157	160	163	166	169	172	175	178	181
DIST.	.9/2	.9/8	.981	.984	.985	.984	.982	.979	.974
LAT.	.8	.5	.3	.0	.3	.5	.8	-1.1	-1.3
LONG.	174.4	173.7	172.9	172.1	171.4	170.6	169.8	169.1	168.4

HELIOS. 1 EXP 3 (HOURLY AVERAGES)

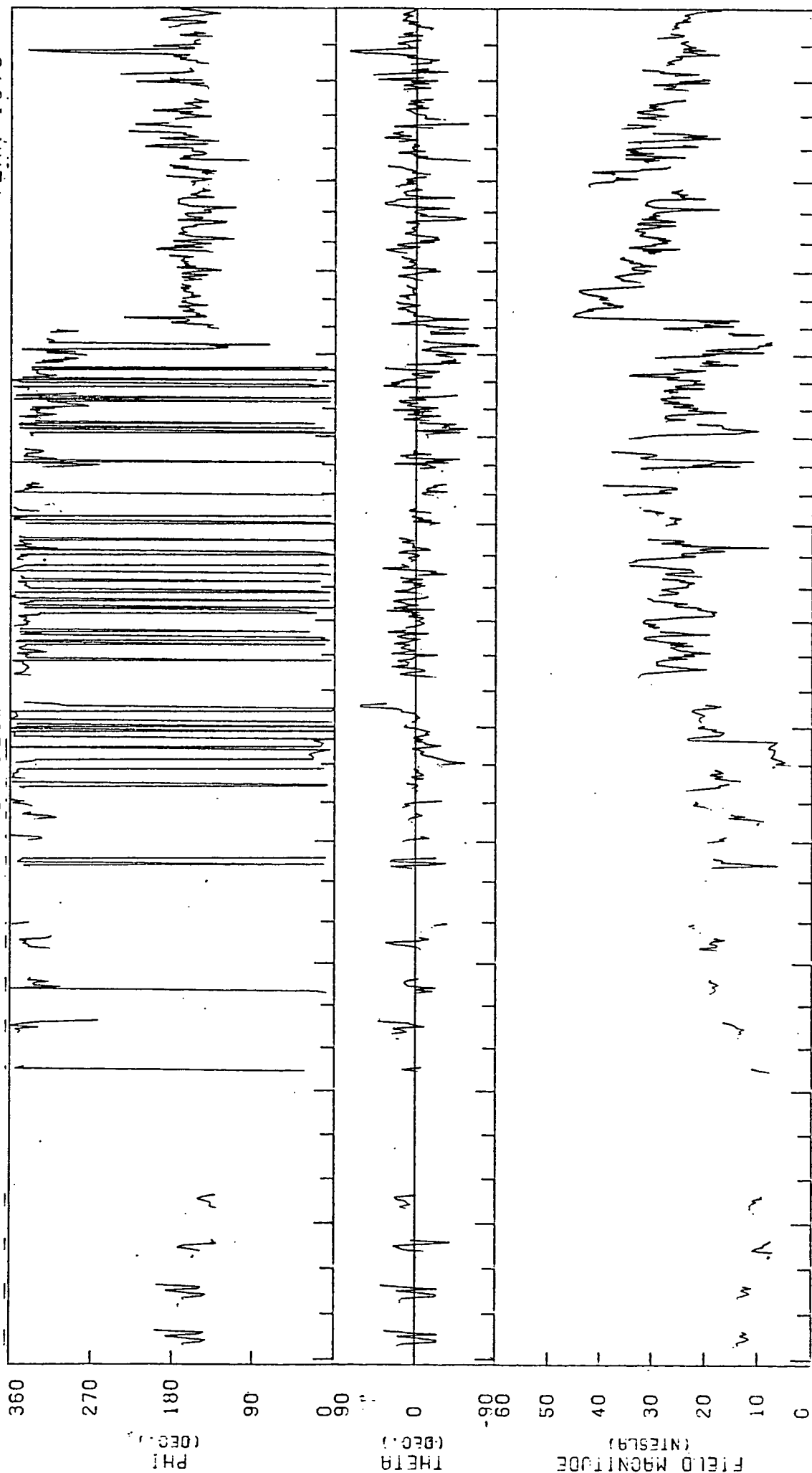
YEAR 1975



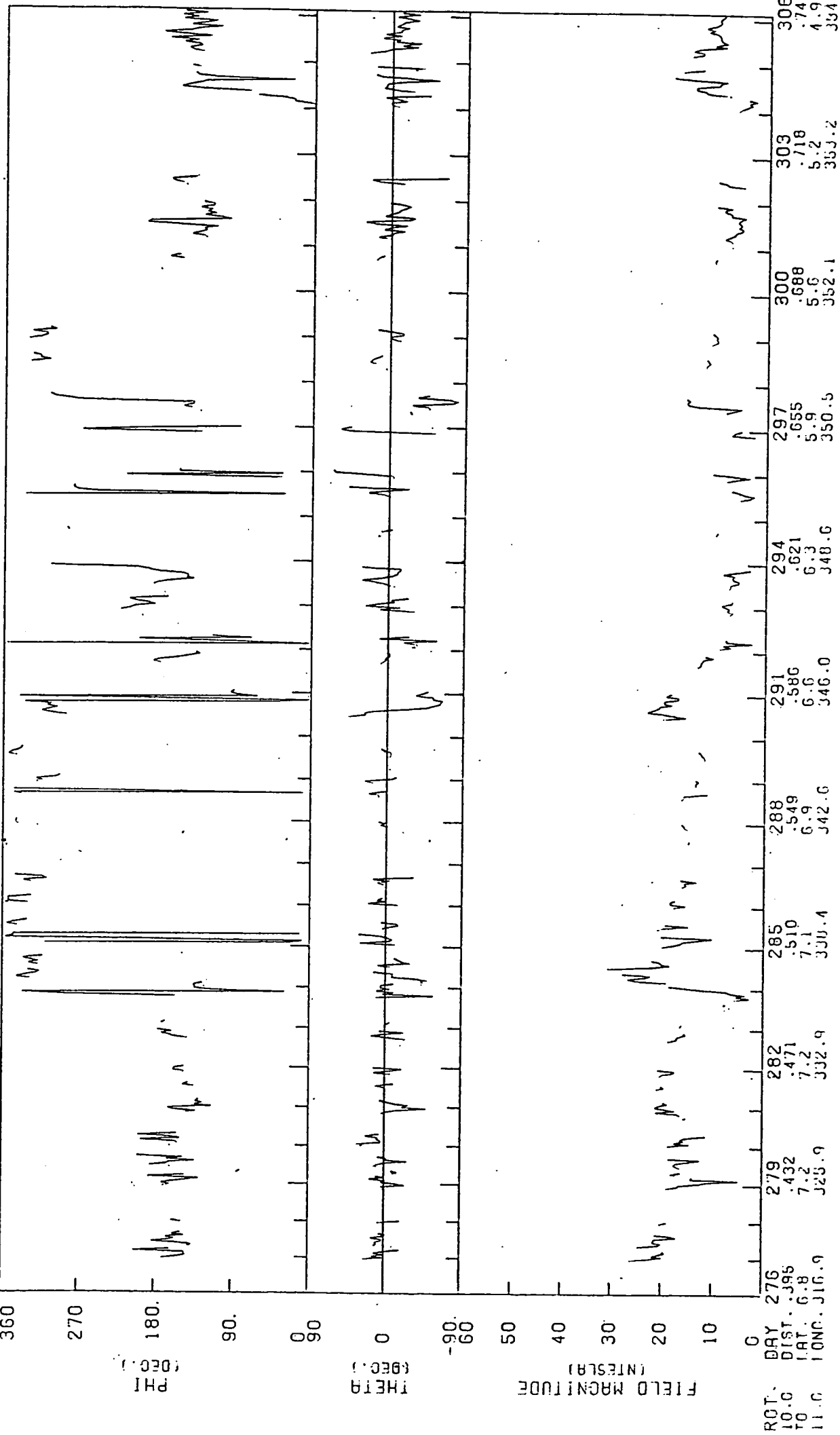


HELIOS 1 EXP 3 (HOURLY AVERAGES)

YEAR 1975

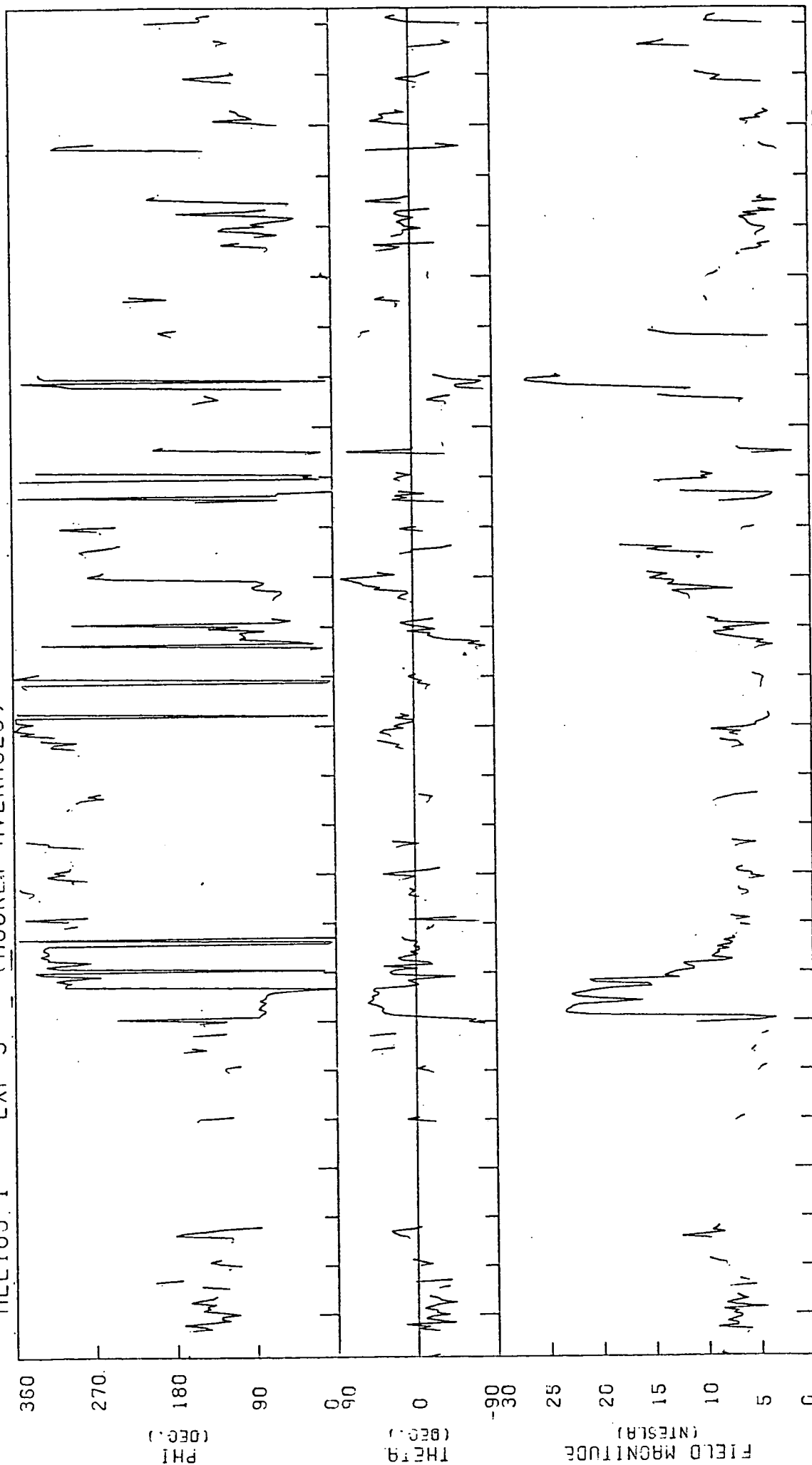


DAY	238	241	244	247	250	253	256	259	262	265	268	271	274
ROT.	9.0	5.49	5.11	4.72	4.33	3.95	3.61	3.32	3.14	3.10	3.19	3.41	3.71
1ST	5.06	5.49	5.11	4.72	4.33	3.95	3.61	3.32	3.14	3.10	3.19	3.41	3.71
2ND	5.06	5.49	5.11	4.72	4.33	3.95	3.61	3.32	3.14	3.10	3.19	3.41	3.71

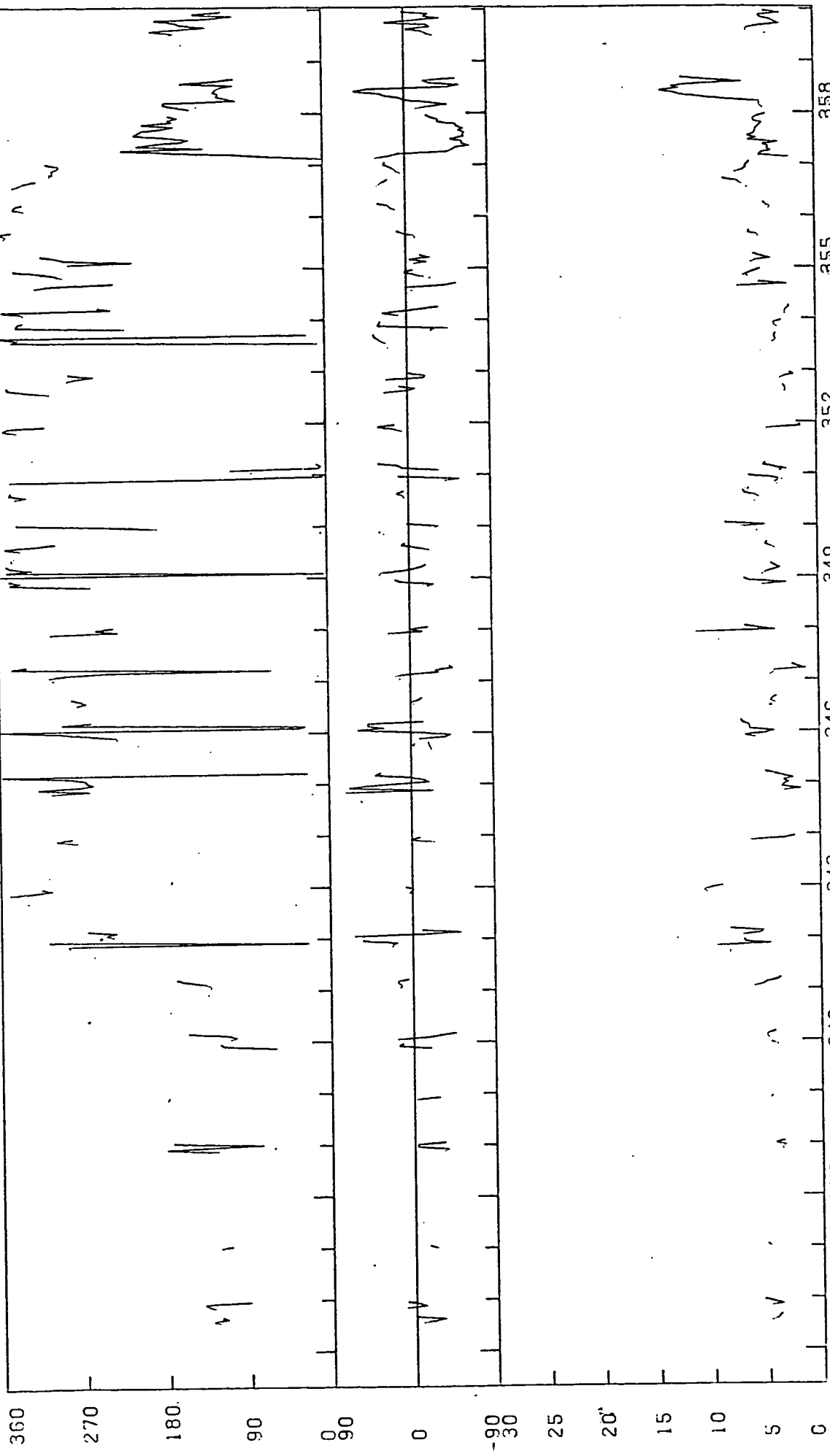


YEAR 1975

HELIOS. 1 EXP 3 (HOURLY AVERAGES)

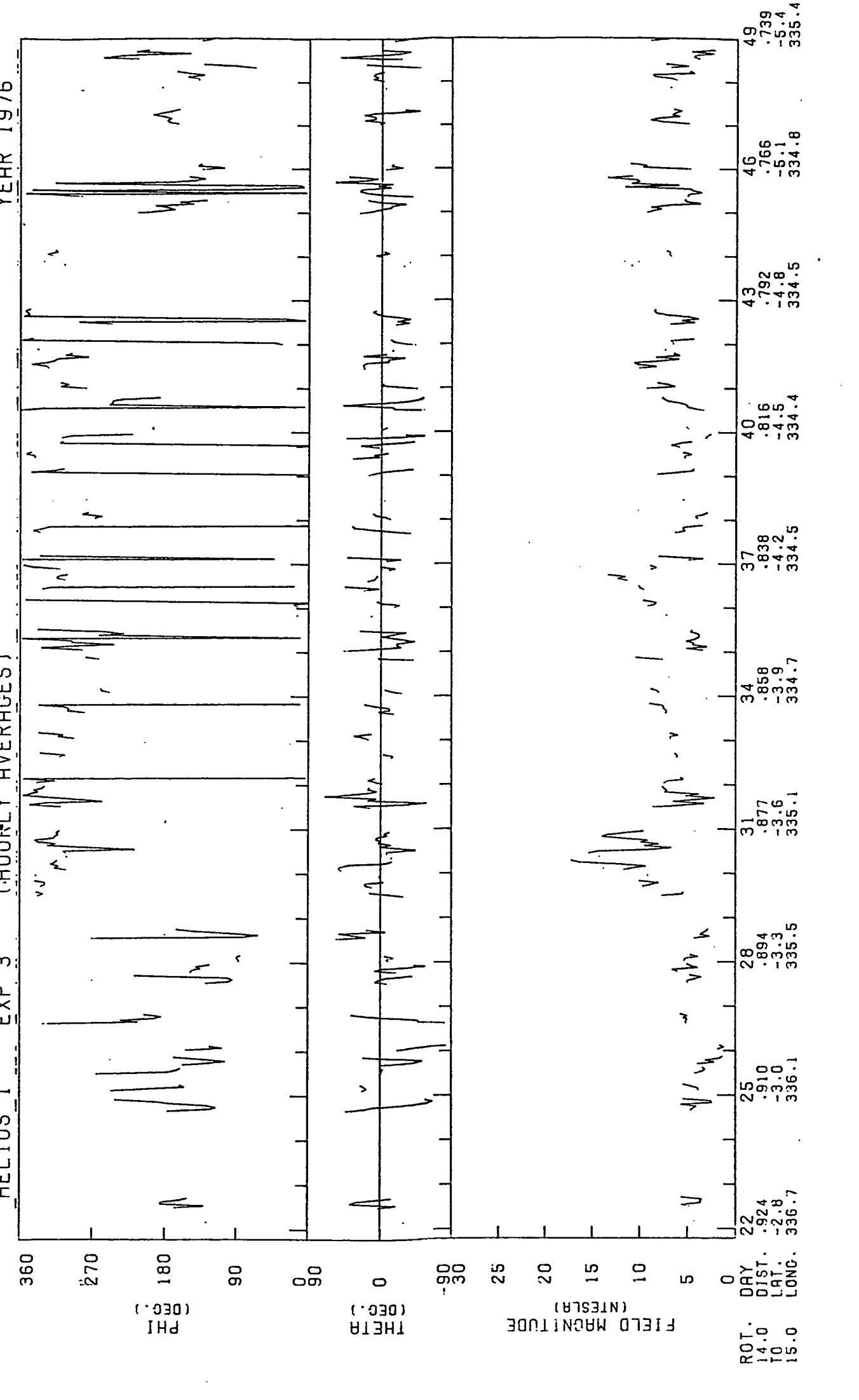


ROT. DAY DIST. 307 .756 310 .782 313 .806 316 .829 319 .850 322 .870 325 .888 328 .904 331 .919 2.3 2.6 2.9 3.2 3.5 3.8 4.1 4.4 4.7 5.0 5.3 5.6 5.9 6.2 6.5 6.8 7.1 7.4 7.7 8.0 8.3 8.6 8.9 9.2 9.5 9.8 10.1 10.4 10.7 11.0 11.3 11.6 11.9 12.2 12.5 12.8 13.1 13.4 13.7 14.0 14.3 14.6 14.9 15.2 15.5 15.8 16.1 16.4 16.7 17.0 17.3 17.6 17.9 18.2 18.5 18.8 19.1 19.4 19.7 20.0 20.3 20.6 20.9 21.2 21.5 21.8 22.1 22.4 22.7 23.0 23.3 23.6 23.9 24.2 24.5 24.8 25.1 25.4 25.7 26.0 26.3 26.6 26.9 27.2 27.5 27.8 28.1 28.4 28.7 29.0 29.3 29.6 29.9 30.2 30.5 30.8 31.1 31.4 31.7 32.0 32.3 32.6 32.9 33.2 33.5 33.8 34.1 34.4 34.7 35.0 35.3 35.6 35.9 36.2 36.5 36.8 37.1 37.4 37.7 38.0 38.3 38.6 38.9 39.2 39.5 39.8 40.1 40.4 40.7 41.0 41.3 41.6 41.9 42.2 42.5 42.8 43.1 43.4 43.7 44.0 44.3 44.6 44.9 45.2 45.5 45.8 46.1 46.4 46.7 47.0 47.3 47.6 47.9 48.2 48.5 48.8 49.1 49.4 49.7 50.0 50.3 50.6 50.9 51.2 51.5 51.8 52.1 52.4 52.7 53.0 53.3 53.6 53.9 54.2 54.5 54.8 55.1 55.4 55.7 56.0 56.3 56.6 56.9 57.2 57.5 57.8 58.1 58.4 58.7 59.0 59.3 59.6 59.9 60.2 60.5 60.8 61.1 61.4 61.7 62.0 62.3 62.6 62.9 63.2 63.5 63.8 64.1 64.4 64.7 65.0 65.3 65.6 65.9 66.2 66.5 66.8 67.1 67.4 67.7 68.0 68.3 68.6 68.9 69.2 69.5 69.8 70.1 70.4 70.7 71.0 71.3 71.6 71.9 72.2 72.5 72.8 73.1 73.4 73.7 74.0 74.3 74.6 74.9 75.2 75.5 75.8 76.1 76.4 76.7 77.0 77.3 77.6 77.9 78.2 78.5 78.8 79.1 79.4 79.7 80.0 80.3 80.6 80.9 81.2 81.5 81.8 82.1 82.4 82.7 83.0 83.3 83.6 83.9 84.2 84.5 84.8 85.1 85.4 85.7 86.0 86.3 86.6 86.9 87.2 87.5 87.8 88.1 88.4 88.7 89.0 89.3 89.6 89.9 90.2 90.5 90.8 91.1 91.4 91.7 92.0 92.3 92.6 92.9 93.2 93.5 93.8 94.1 94.4 94.7 95.0 95.3 95.6 95.9 96.2 96.5 96.8 97.1 97.4 97.7 98.0 98.3 98.6 98.9 99.2 99.5 99.8 100.1 100.4 100.7 101.0 101.3 101.6 101.9 102.2 102.5 102.8 103.1 103.4 103.7 104.0 104.3 104.6 104.9 105.2 105.5 105.8 106.1 106.4 106.7 107.0 107.3 107.6 107.9 108.2 108.5 108.8 109.1 109.4 109.7 110.0 110.3 110.6 110.9 111.2 111.5 111.8 112.1 112.4 112.7 113.0 113.3 113.6 113.9 114.2 114.5 114.8 115.1 115.4 115.7 116.0 116.3 116.6 116.9 117.2 117.5 117.8 118.1 118.4 118.7 119.0 119.3 119.6 119.9 120.2 120.5 120.8 121.1 121.4 121.7 122.0 122.3 122.6 122.9 123.2 123.5 123.8 124.1 124.4 124.7 125.0 125.3 125.6 125.9 126.2 126.5 126.8 127.1 127.4 127.7 128.0 128.3 128.6 128.9 129.2 129.5 129.8 130.1 130.4 130.7 131.0 131.3 131.6 131.9 132.2 132.5 132.8 133.1 133.4 133.7 134.0 134.3 134.6 134.9 135.2 135.5 135.8 136.1 136.4 136.7 137.0 137.3 137.6 137.9 138.2 138.5 138.8 139.1 139.4 139.7 140.0 140.3 140.6 140.9 141.2 141.5 141.8 142.1 142.4 142.7 143.0 143.3 143.6 143.9 144.2 144.5 144.8 145.1 145.4 145.7 146.0 146.3 146.6 146.9 147.2 147.5 147.8 148.1 148.4 148.7 149.0 149.3 149.6 149.9 150.2 150.5 150.8 151.1 151.4 151.7 152.0 152.3 152.6 152.9 153.2 153.5 153.8 154.1 154.4 154.7 155.0 155.3 155.6 155.9 156.2 156.5 156.8 157.1 157.4 157.7 158.0 158.3 158.6 158.9 159.2 159.5 159.8 160.1 160.4 160.7 161.0 161.3 161.6 161.9 162.2 162.5 162.8 163.1 163.4 163.7 164.0 164.3 164.6 164.9 165.2 165.5 165.8 166.1 166.4 166.7 167.0 167.3 167.6 167.9 168.2 168.5 168.8 169.1 169.4 169.7 170.0 170.3 170.6 170.9 171.2 171.5 171.8 172.1 172.4 172.7 173.0 173.3 173.6 173.9 174.2 174.5 174.8 175.1 175.4 175.7 176.0 176.3 176.6 176.9 177.2 177.5 177.8 178.1 178.4 178.7 179.0 179.3 179.6 179.9 180.2 180.5 180.8 181.1 181.4 181.7 182.0 182.3 182.6 182.9 183.2 183.5 183.8 184.1 184.4 184.7 185.0 185.3 185.6 185.9 186.2 186.5 186.8 187.1 187.4 187.7 188.0 188.3 188.6 188.9 189.2 189.5 189.8 190.1 190.4 190.7 191.0 191.3 191.6 191.9 192.2 192.5 192.8 193.1 193.4 193.7 194.0 194.3 194.6 194.9 195.2 195.5 195.8 196.1 196.4 196.7 197.0 197.3 197.6 197.9 198.2 198.5 198.8 199.1 199.4 199.7 200.0 200.3 200.6 200.9 201.2 201.5 201.8 202.1 202.4 202.7 203.0 203.3 203.6 203.9 204.2 204.5 204.8 205.1 205.4 205.7 206.0 206.3 206.6 206.9 207.2 207.5 207.8 208.1 208.4 208.7 209.0 209.3 209.6 209.9 210.2 210.5 210.8 211.1 211.4 211.7 212.0 212.3 212.6 212.9 213.2 213.5 213.8 214.1 214.4 214.7 215.0 215.3 215.6 215.9 216.2 216.5 216.8 217.1 217.4 217.7 218.0 218.3 218.6 218.9 219.2 219.5 219.8 220.1 220.4 220.7 221.0 221.3 221.6 221.9 222.2 222.5 222.8 223.1 223.4 223.7 224.0 224.3 224.6 224.9 225.2 225.5 225.8 226.1 226.4 226.7 227.0 227.3 227.6 227.9 228.2 228.5 228.8 229.1 229.4 229.7 230.0 230.3 230.6 230.9 231.2 231.5 231.8 232.1 232.4 232.7 233.0 233.3 233.6 233.9 234.2 234.5 234.8 235.1 235.4 235.7 236.0 236.3 236.6 236.9 237.2 237.5 237.8 238.1 238.4 238.7 239.0 239.3 239.6 239.9 240.2 240.5 240.8 241.1 241.4 241.7 242.0 242.3 242.6 242.9 243.2 243.5 243.8 244.1 244.4 244.7 245.0 245.3 245.6 245.9 246.2 246.5 246.8 247.1 247.4 247.7 248.0 248.3 248.6 248.9 249.2 249.5 249.8 250.1 250.4 250.7 251.0 251.3 251.6 251.9 252.2 252.5 252.8 253.1 253.4 253.7 254.0 254.3 254.6 254.9 255.2 255.5 255.8 256.1 256.4 256.7 257.0 257.3 257.6 257.9 258.2 258.5 258.8 259.1 259.4 259.7 260.0 260.3 260.6 260.9 261.2 261.5 261.8 262.1 262.4 262.7 263.0 263.3 263.6 263.9 264.2 264.5 264.8 265.1 265.4 265.7 266.0 266.3 266.6 266.9 267.2 267.5 267.8 268.1 268.4 268.7 269.0 269.3 269.6 269.9 270.2 270.5 270.8 271.1 271.4 271.7 272.0 272.3 272.6 272.9 273.2 273.5 273.8 274.1 274.4 274.7 275.0 275.3 275.6 275.9 276.2 276.5 276.8 277.1 277.4 277.7 278.0 278.3 278.6 278.9 279.2 279.5 279.8 280.1 280.4 280.7 281.0 281.3 281.6 281.9 282.2 282.5 282.8 283.1 283.4 283.7 284.0 284.3 284.6 284.9 285.2 285.5 285.8 286.1 286.4 286.7 287.0 287.3 287.6 287.9 288.2 288.5 288.8 289.1 289.4 289.7 290.0 290.3 290.6 290.9 291.2 291.5 291.8 292.1 292.4 292.7 293.0 293.3 293.6 293.9 294.2 294.5 294.8 295.1 295.4 295.7 296.0 296.3 296.6 296.9 297.2 297.5 297.8 298.1 298.4 298.7 299.0 299.3 299.6 299.9 300.2 300.5 300.8 301.1 301.4 301.7 302.0 302.3 302.6 302.9 303.2 303.5 303.8 304.1 304.4 304.7 305.0 305.3 305.6 305.9 306.2 306.5 306.8 307.1 307.4 307.7 308.0 308.3 308.6 308.9 309.2 309.5 309.8 310.1 310.4 310.7 311.0 311.3 311.6 311.9 312.2 312.5 312.8 313.1 313.4 313.7 314.0 314.3 314.6 314.9 315.2 315.5 315.8 316.1 316.4 316.7 317.0 317.3 317.6 317.9 318.2 318.5 318.8 319.1 319.4 319.7 320.0 320.3 320.6 320.9 321.2 321.5 321.8 322.1 322.4 322.7 323.0 323.3 323.6 323.9 324.2 324.5 324.8 325.1 325.4 325.7 326.0 326.3 326.6 326.9 327.2 327.5 327.8 328.1 328.4 328.7 329.0 329.3 329.6 329.9 330.2 330.5 330.8 331.1 331.4 331.7 332.0 332.3 332.6 332.9 333.2 333.5 333.8 334.1 334.4 334.7 335.0 335.3 335.6 335.9 336.2 336.5 336.8 337.1 337.4 337.7 338.0 338.3 338.6 338.9 339.2 339.5 339.8 340.1 340.4 340.7 341.0 341.3 341.6 341.9 342.2 342.5 342.8 343.1 343.4 343.7 344.0 344.3 344.6 344.9 345.2 345.5 345.8 346.1 346.4 346.7 347.0 347.3 347.6 347.9 348.2 348.5 348.8 349.1 349.4 349.7 350.0 350.3 350.6 350.9 351.2 351.5 351.8 352.1 352.4 352.7 353.0 353.3 353.6 353.9 354.2 354.5 354.8 355.1 355.4 355.7 356.0 356.3 356.6 356.9 357.2 357.5 357.8 358.1 358.4 358.7 359.0 359.3 359.6 359.9 360.2 360.5 360.8 361.1 361.4 361.7 362.0 362.3 362.6 362.9 363.2 363.5 363.8 364.1 364.4 364.7 365.0 365.3 365.6 365.9 366.2 366.5 366.8 367.1 367.4 367.7 368.0 368.3 368.6 368.9 369.2 369.5 369.8 370.1 370.4 370.7 371.0 371.3 371.6 371.9 372.2 372.5 372.8 373.1 373.4 373.7 374.0 374.3 374.6 374.9 375.2 375.5 375.8 376.1 376.4 376.7 377.0 377.3 377.6 377.9 378.2 378.5 378.8 379.1 379.4 379.7 380.0 380.3 380.6 380.9 381.2 381.5 381.8 382.1 382.4 382.7 383.0 383.3 383.6 383.9 384.2 384.5 384.8 385.1 385.4 385.7 386.0 386.3 386.6 386.9 387.2 387.5 387.8 388.1 388.4 388.7 389.0 389.3 389.6 389.9 390.2 390.5 390.8 391.1 391.4 391.7 392.0 392.3 392.6 392.9 393.2 393.5 393.8 394.1 394.4 394.7 395.0 395.3 395.6 395.9 396.2 396.5 396.8 397.1 397.4 397.7 398.0 398.3 398.6 398.9 399.2 399.5 399.8 400.1 400.4 400.7 401.0 401.3 401.6 401.9 402.2 402.5 402.8 403.1 403.4 403.7 404.0 404.3 404.6 404.9 405.2 405.5 405.8 406.1 406.4 406.7 407.0 407.3 407.6 407.9 408.2 408.5 408.8 409.1 409.4 409.7 410.0 410.3 410.6 410.9 411.2 411.5 411.8 412.1 412.4 412.7 413.0 413.3 413.6 413.9 414.2 414.5 414.8 415.1 415.4 415.7 416.0 416.3 416.6 416.9 417.2 417.5 417.8 418.1 418.4 418.7 419.0 419.3 419.6 419.9 420.2 420.5 420.8 421.1 421.4 421.7 422.0 422.3 422.6 422.9 423.2 423.5 423.8 424.1 424.4 424.7 425.0 425.3 425.6 425.9 426.2 426.5 426.8 427.1 427.4 427.7 428.0 428.3 428.6 428.9 429.2 429.5 429.8 430.1 430.4 430.7 431.0 431.3 431.6 431.9 432.2 432.5 432.8 433.1 433.4 433.7 434.0 434.3 434.6 434.9 435.2 435.5 435.8 436.1 436.4 436.7 437.0 437.3 437.6 437.9 438.2 438.5 438.8 439.1 439.4 439.7 440.0 440.3 440.6 440.9 441.2 441.5 441.8 442.1 442.4 442.7 443.0 443.3 443.6 443.9 444.2 444.5 444.8 445.1 445.4 445.7 446.0 446.3 446.6 446.9 447.2 447.5 447.8 448.1 448.4 448.7 449.0 449.3 449.6 449.9 450.2 450.5 450.8 451.1 451.4 451.7 452.0 452.3 452.6 452.9 453.2 453.5 453.8 454.1 454.4 454.7 455.0 455.3 455.6 455.9 456.2 456.5 456.8 457.1 457.4 457.7 458.0 458.3 458.6 458.9 459.2 459.5 459.8 460.1 460.4 460.7 461.0 461.3 461.6 461.9 462.2 462.5 462.8 463.1 463.4 463.7 464.0 464.3 464.6 464.9 465.2 465.5 465.8 466.1 466.4 466.7 467.0 467.3 467.6 467.9 468.2 468.5 468.8 469.1 469.4 469.7 470.0 470.3 470.6 470.9 471.2 471.5 471.8 472.1 472.4 472.7 473.0 473.3 473.6 473.9 474.2 474.5 474.8 475.1 475.4 475.7 476.0 476.3 476.6 476.9 477.2 477.5 477.8 478.1 478.4 478.7 479.0 479.3 479.6 479.9 480.2 480.5 480.8 481.1 481.4 481.7 482.0 482.3 482.6 482.9 483.2 483.5 483.8 484.1 484.4 484.7 485.0 485.3 485.6 485.9 486.2 486.5 486.8 487.1 487.4 487.7 488.0 488.3 488.6 488.9 489.2 489.5 489.8 490.1 490.4 490.7 491.0 491.3 491.6 491.9 492.2 492.5 492.8 493.1 493.4 493.7 494.0 494.3 494.6 494.9 495.2 495.5 495.8 496.1 496.4 496.7 497.0 497.3 497.6 497.9 498.2 498.5 498.8 499.1 499.4 499.7 500.0 500.3 500.6 500.9 501.2 501.5 501.8 502.1 502.4 502.7 503.0 503.3 503.6 503.9 504.2 504.5 504.8 505.1 505.4 505.7 506.0 506.3 506.6 506.9 507.2 507.5 507.8 508.1 508.4 508.7 509.0 509.3 509.6 509.9 510.2 510.5 510.8 511.1 511.4 511.7 512.0 512.3 512.6 512.9 513.2 513.5 513.8 514.1 514.4 514.7 515.0 515.3 515.6 515.9 516.2 516.5 516.8 517.1 517.4 517.7 518.0 518.3 518.6 518.9 519.2 519.5 519.8 520.1 520.4 520.7 521.0 521.3 521.6 521.9 522.2 522.5 522.8 523.1 523.4 523.7 524.0 524.3 524.6 524.9 525.2 525.5 525.8 526.1 526.4 526.7 527.0 527.3 527.6 527.9 528.2 528.5 528.8 529.1 529.4 529.7 530.0 530.3 530.6 530.9 531.2 531.5 531.8 532.1 532.4 532.7 533.0 533.3 533.6 533.9 534.2 534.5 534.8 535.1 535.4 535.7 536.0 536.3 536.6 536.9 537.2 537.5 537.8 538.1 538.4 538.7 539.0 539.3 539.6 539.9 540.2 540.5 540.8 541.1 541.4 541.7 542.0 542.3 542.6 542.9 543.2 543.5 543.8 544.1 544.4 544.7 545.0 545.3 545.6 545.9 546.2 546.5 546.8 547.1 547.4 547.7 548.0 548.3 548.6 548.9 549.2 549.5 549.8 550.1 550.4 550.7 551.0 551.3 551.6 551.9 552.2 552.5 552.8 553.1 553.4 553.7 554.0 554.3 554.6 554.9 555.2 555.5 555.8 556.1 556.4 556.7 557.0 557.3 557.6 557.9 558.2 558.5 558.8 559.1 559.4 559.7 560.0 560.3 560.6 560.9 561.2 561.5 561.8 562.1 562.4 562.7 563.0 563.3 563.6 563.9 564.2 564.5 564.8 565.1 565.4 565.7 566.0 566.3 566.6 566.9 567.2 567.5 567.8 568.1 568.4 568.7 569.0 569.3 569.6 569.9 570.2 570.5 570.8 571.1 571.4 571.7 572.0 572.3 572.6 572.9 573.2 573.5 573.8 574.1 574.4 574.7 575.0 575.3 575.6 575.9 576.2 576.5 576.8 577.1 577.4 577.7 578.0 578.3 578.6 578.9 579.2 579.5 579.8 580.1 580.4 580.7 581.0 581.3 581.6 581.9 582.2 582.5 582.8 583.1 583.4 583.7 584.0 584.3 584.6 584.9 585.2 585.5 585.8 586.1 586.4 586.7 587.0 587.3 587.6 587.9 588.2 588.5 588.8 589.1 589.4 589.7 590.0 590.3 590.6 590.9 591.2 591.5 591.8 592.1 592.4 592.7 593.0 593.3 593.6 593.9 594.2 594.5 594.8 595.1 595.4 595.7 596.0 596.3 596.6 596.9 597.2 597.5 597.8 598.1 598.4 598.7 599.0 599.3 599.6 600.0



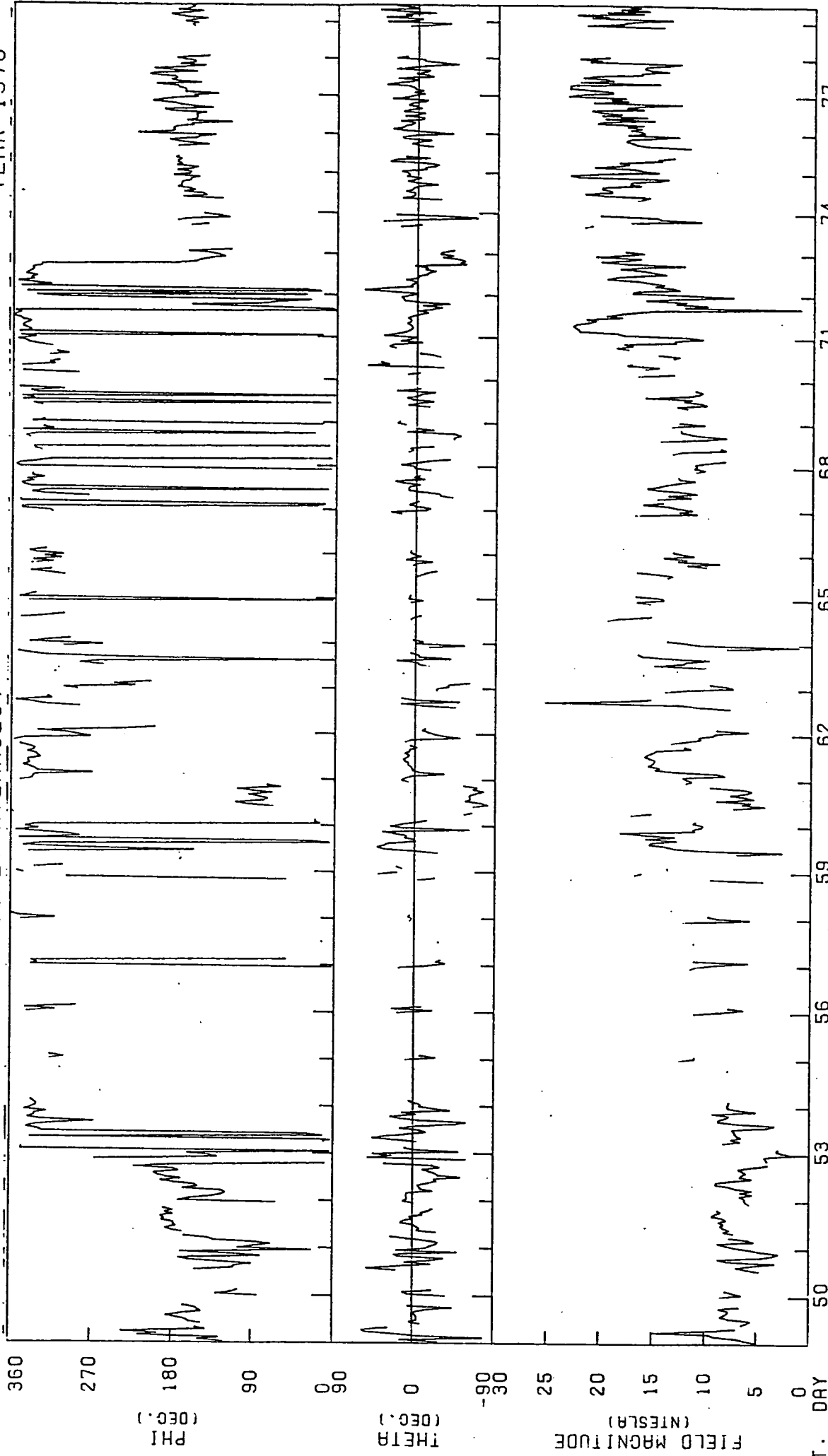
334	337	340	343	346	349	352	355	358
.932	.944	.954	.963	.970	.976	.980	.983	.985
2.0	1.7	1.4	1.2	.9	.6	.4	.1	.2
352.2	351.5	350.7	349.8	349.0	348.1	347.1	346.2	345.2

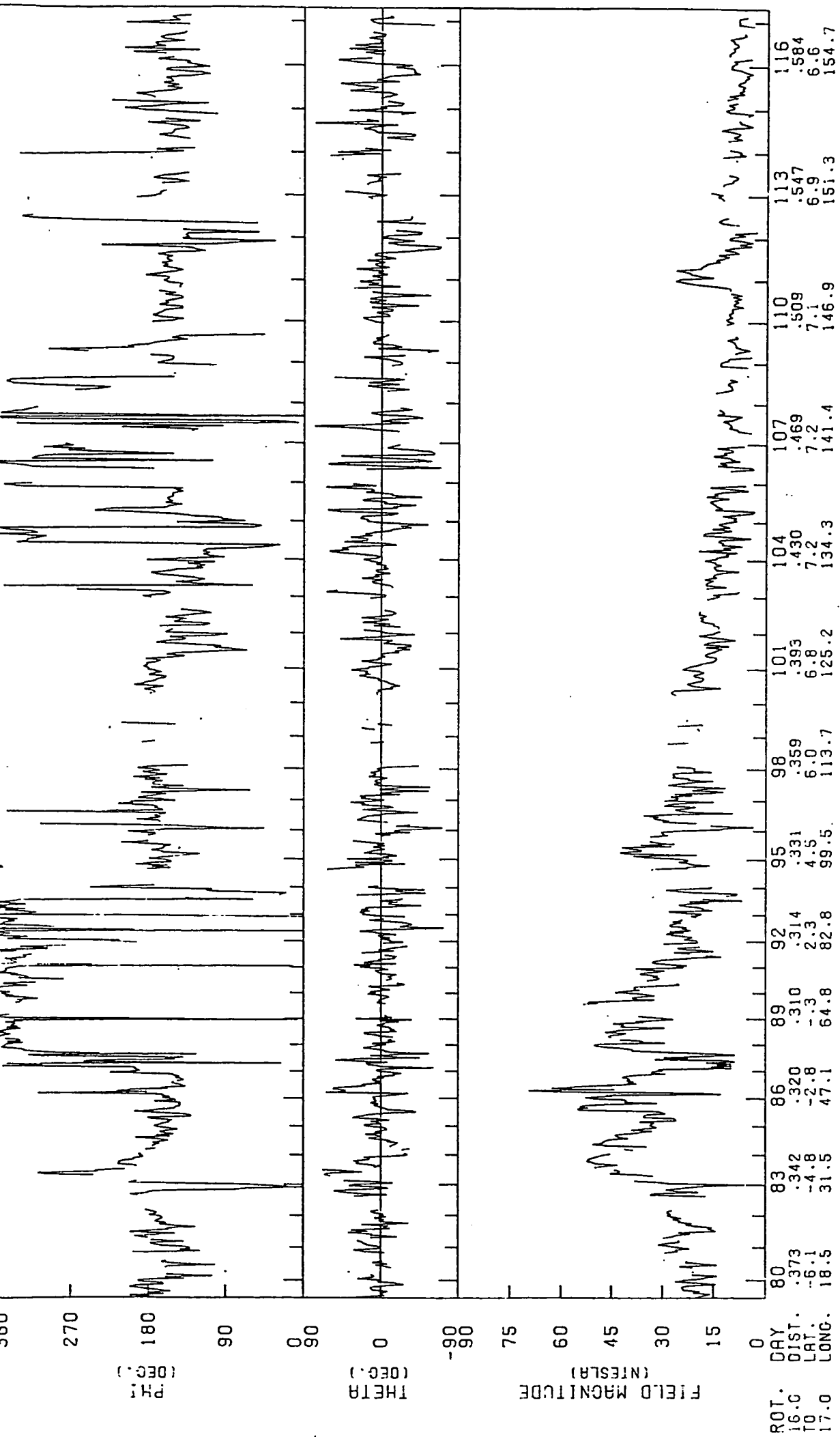
ROT. DAY
12.0
10
13.0
DIST.
LAT.
LONG.

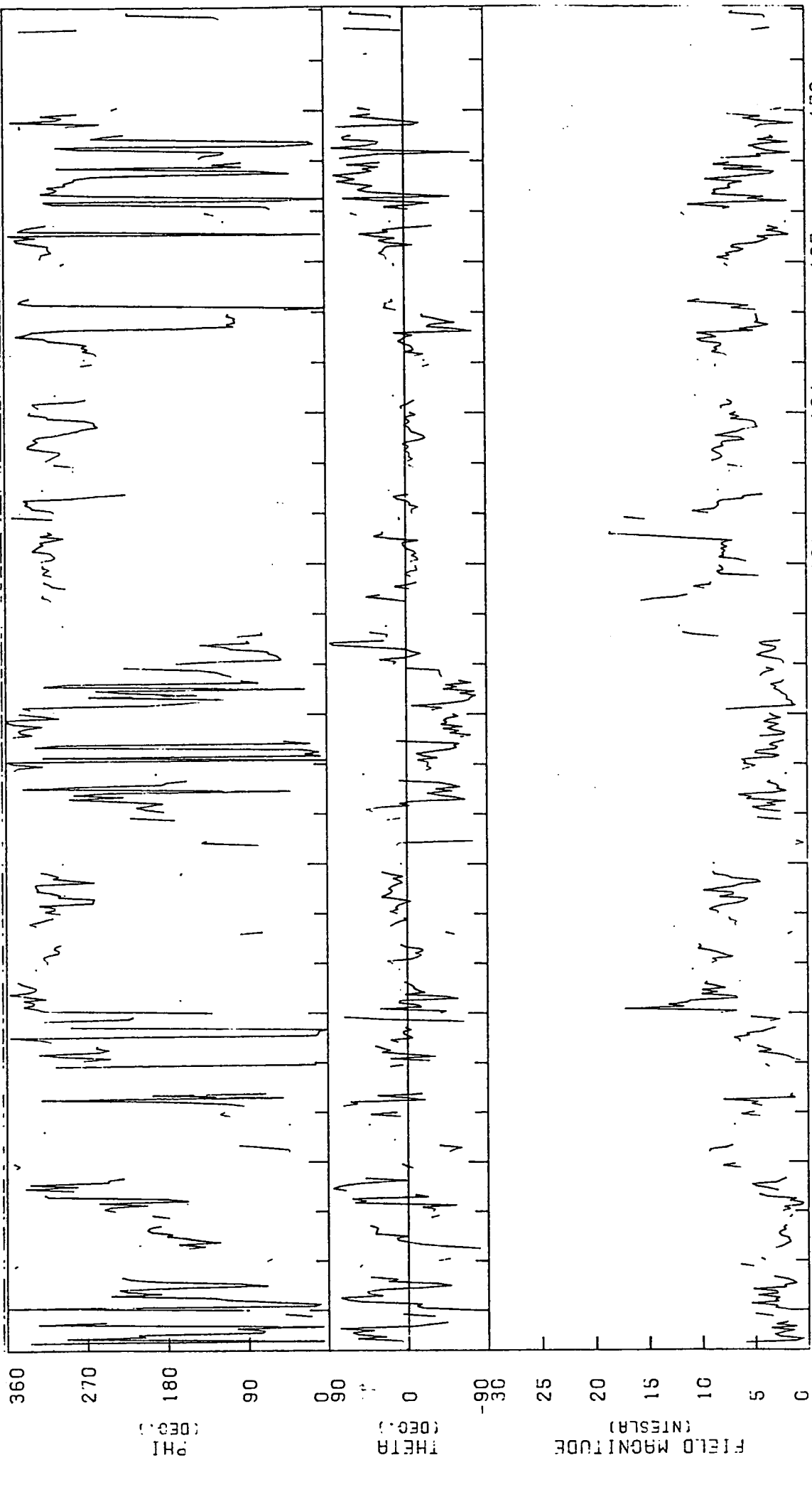


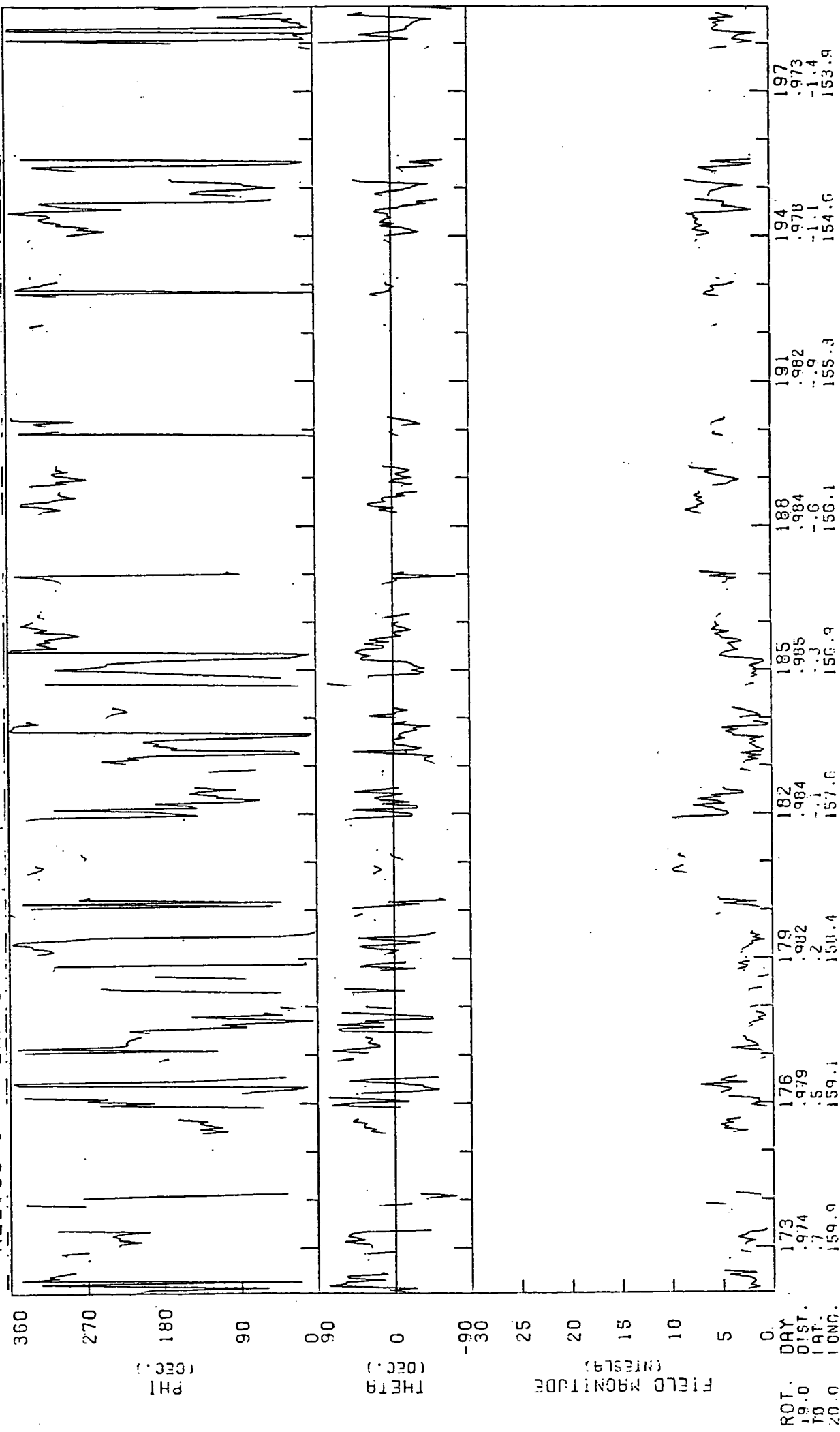
HELIOS 1 EXP 3 (HOURLY AVERAGES)

YEAR 1976



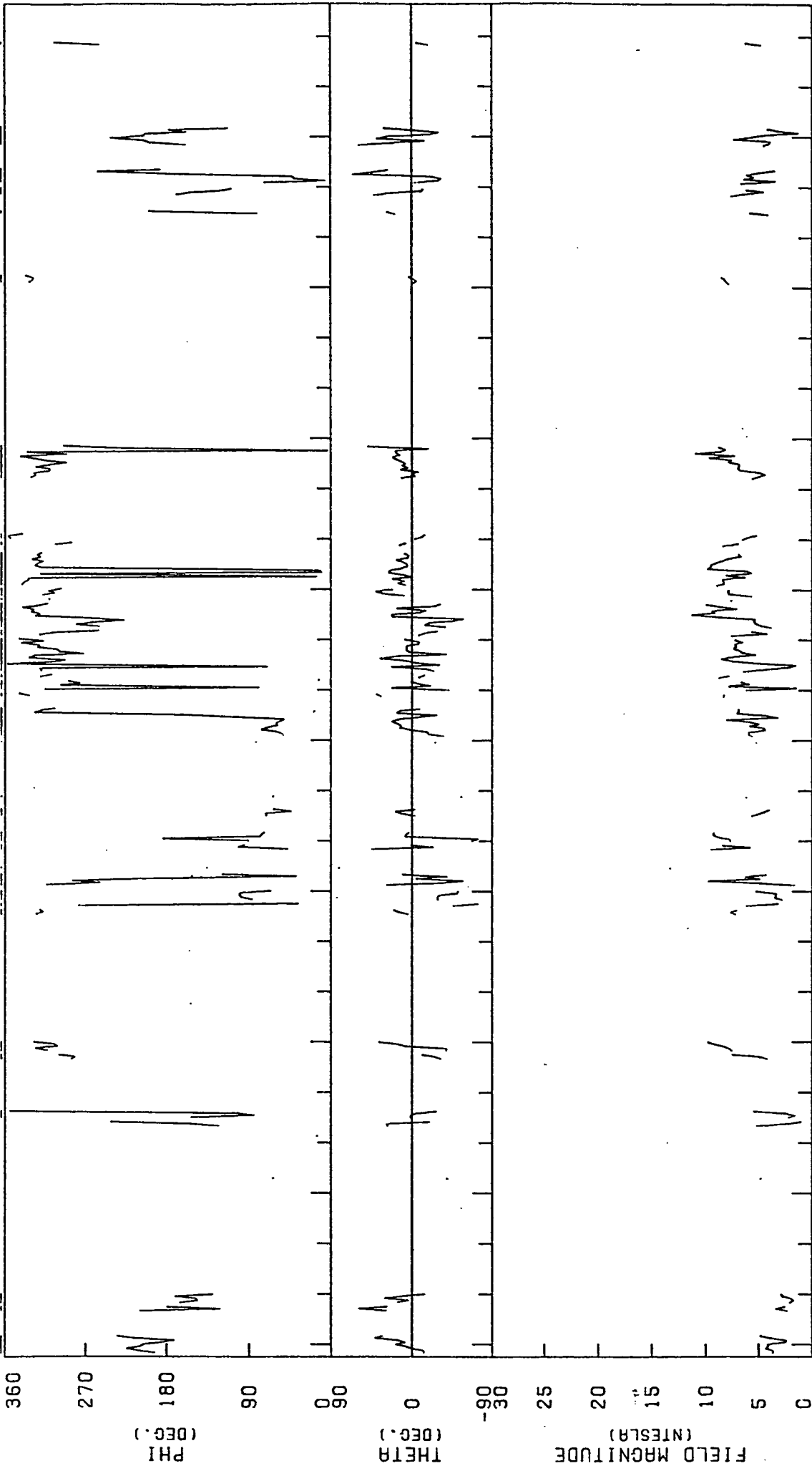


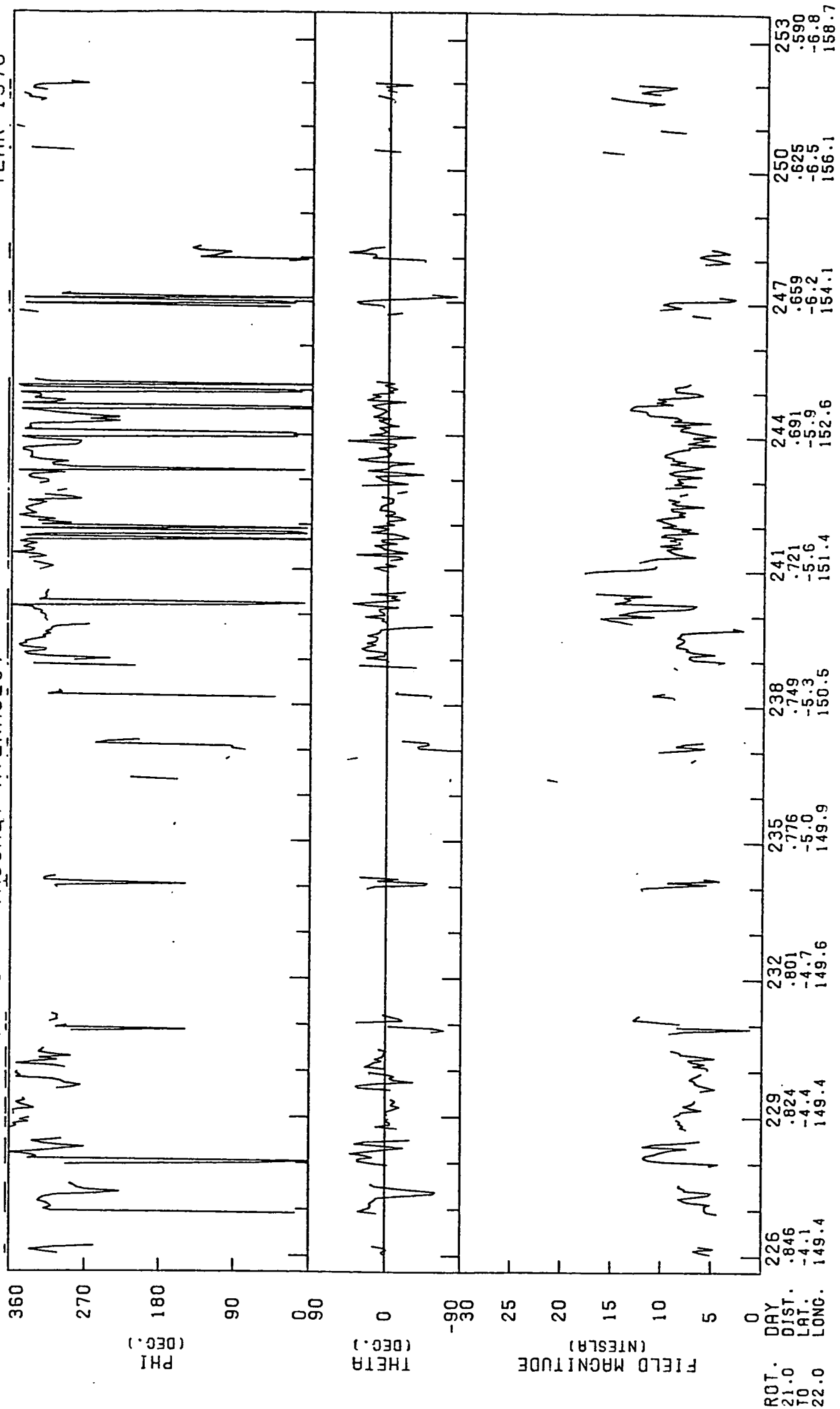




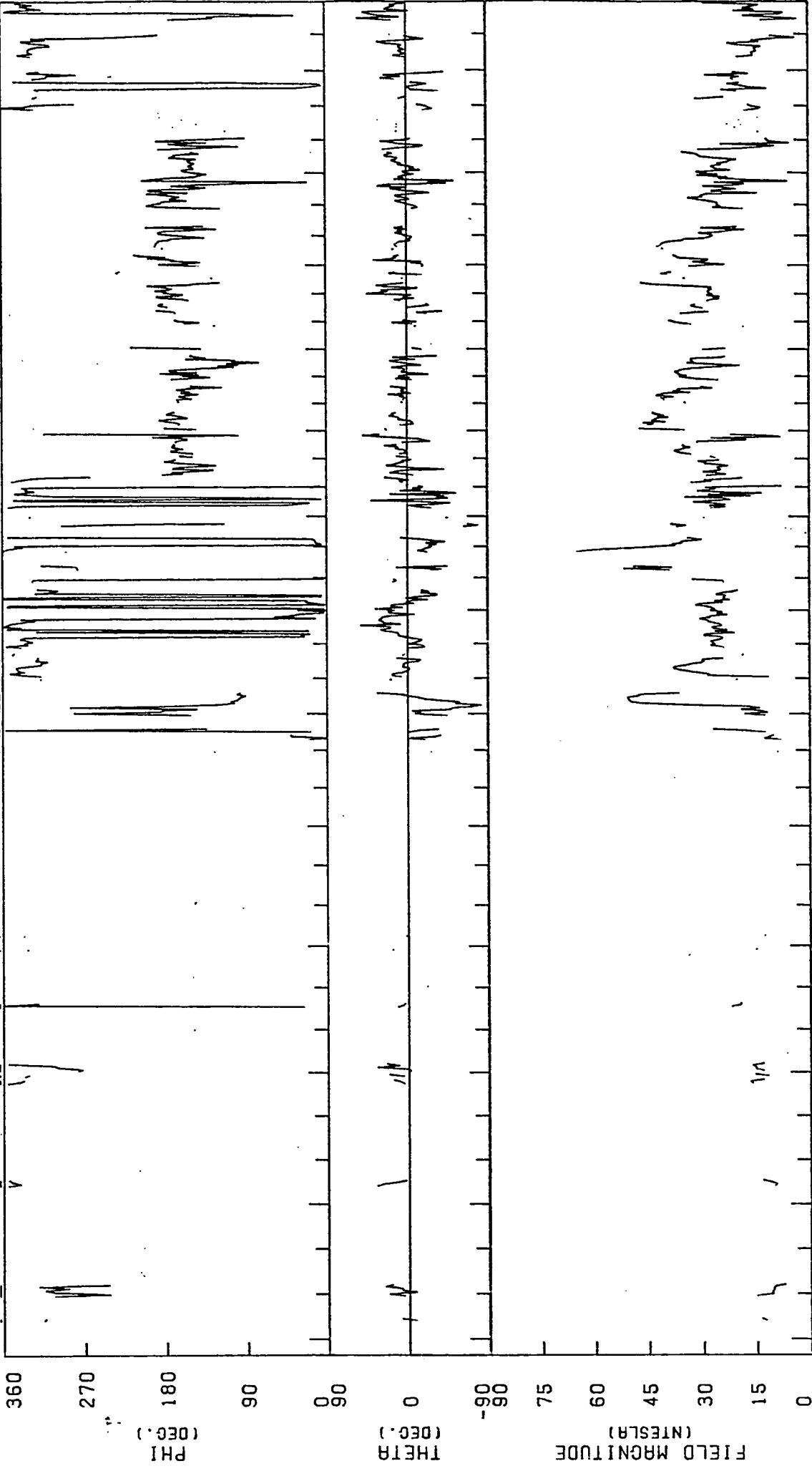
HELIOS 1 EXP 3 (HOURLY AVERAGES)

YEAR 1976

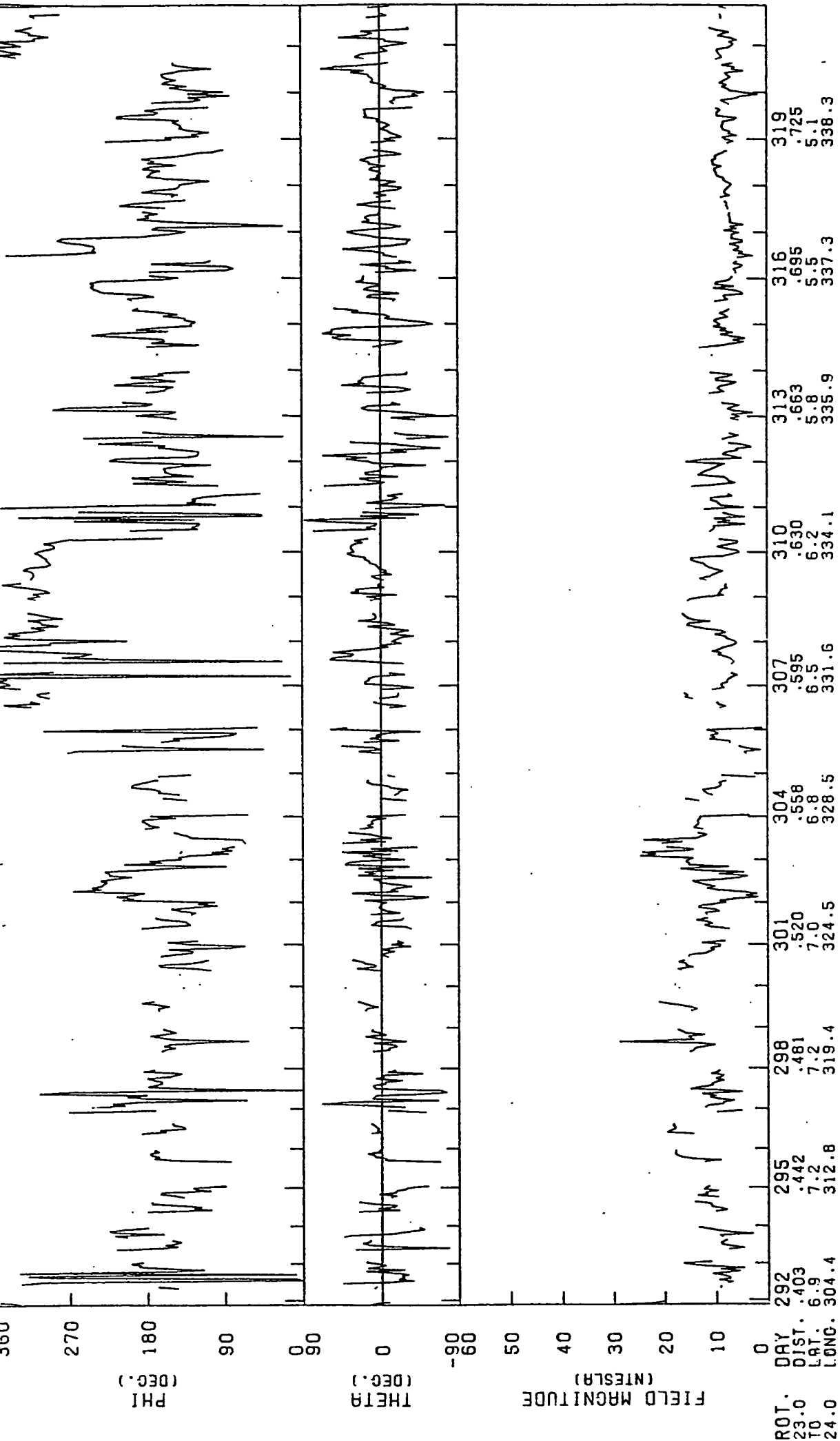




HELIOS 1 EXP 3 (HOURLY AVERAGES) YEAR 1976



ROT. DAY 254 257 260 263 266 269 272 275 278 281 284 287 290
 DIST. .577 .540 .502 .462 .423 .386 .353 .327 .312 .311 .323 .347 .379

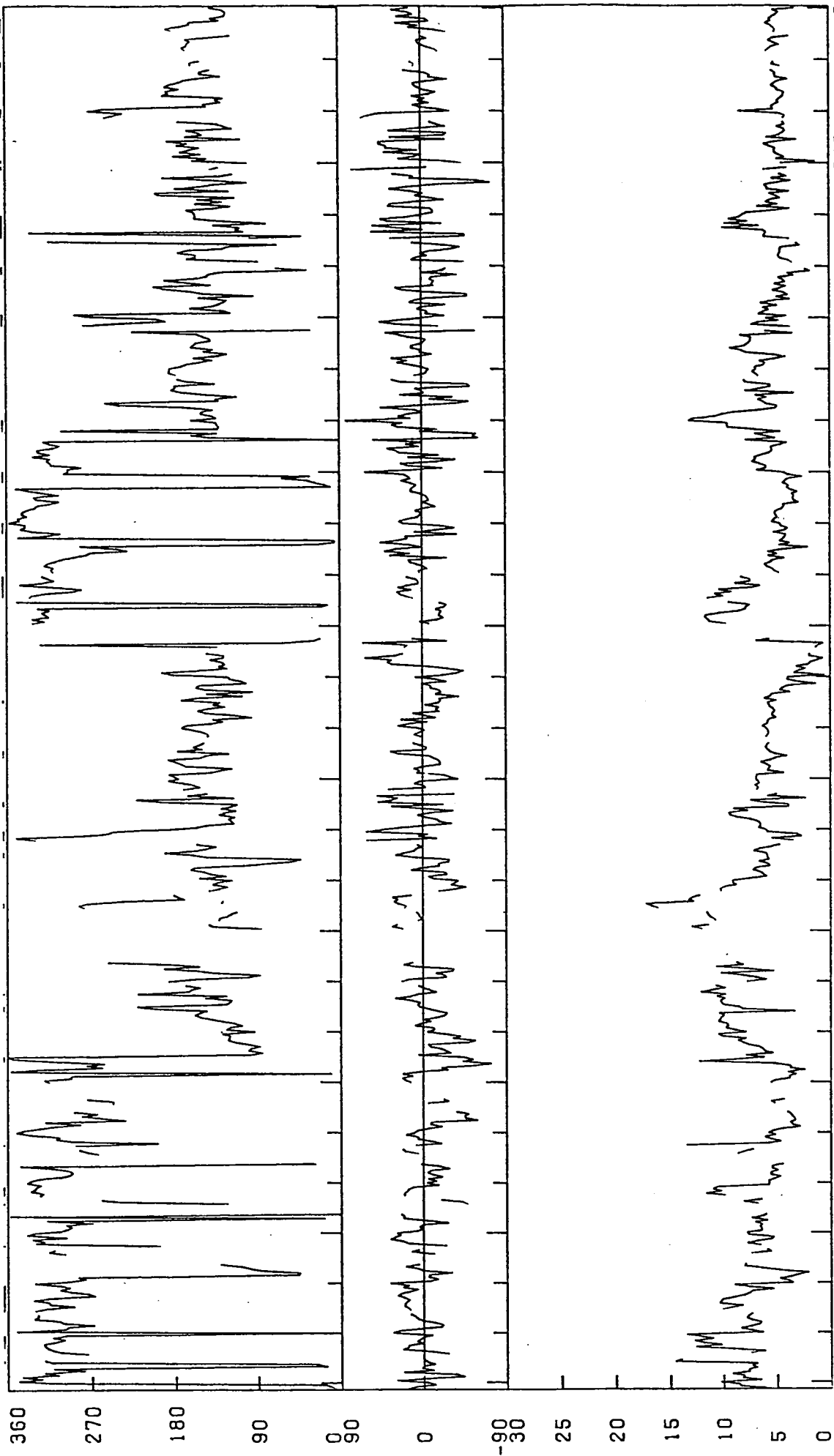


YEAR 1976

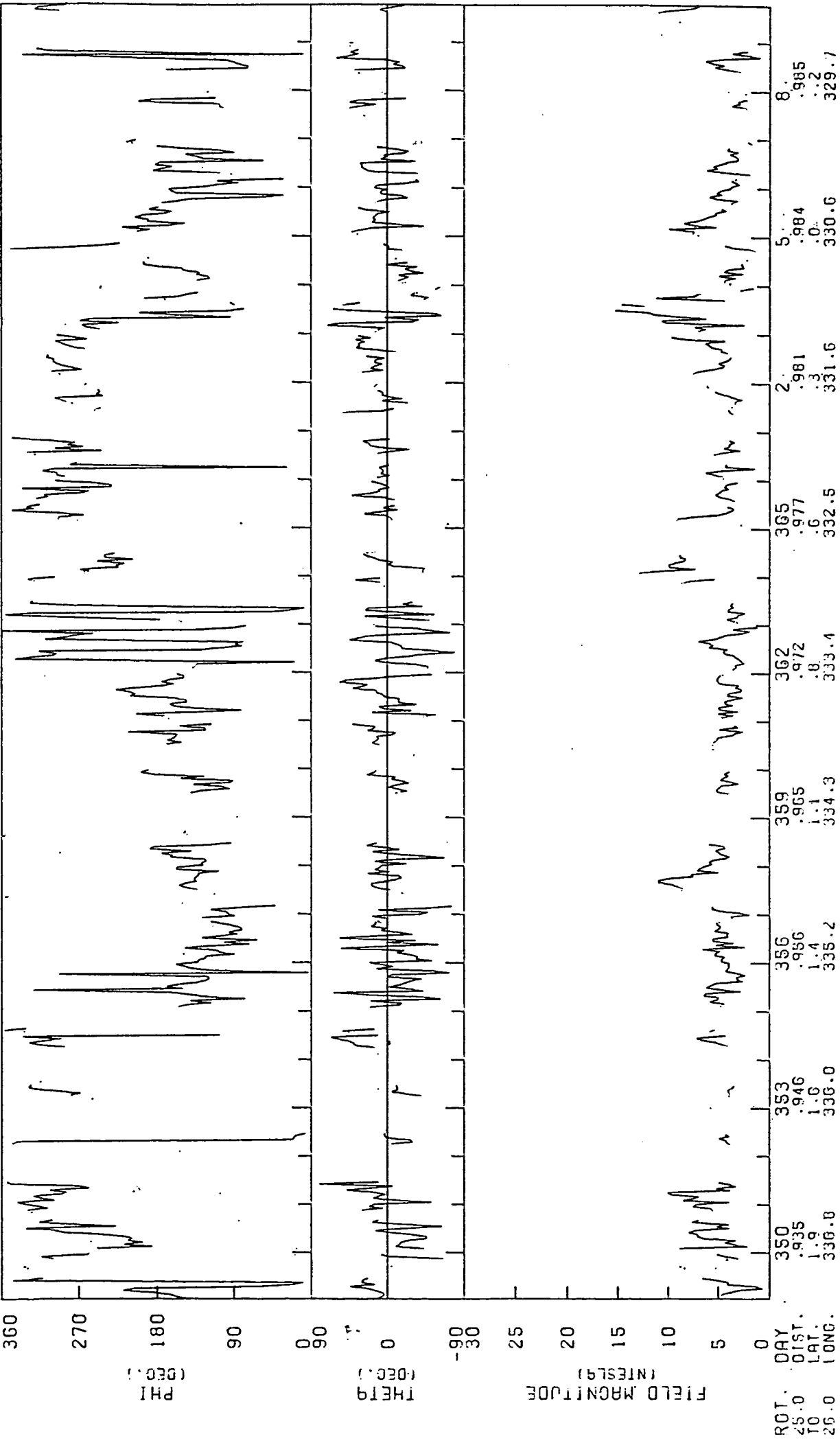
(HOURLY AVERAGES)

EXP 3

HELIOS 1

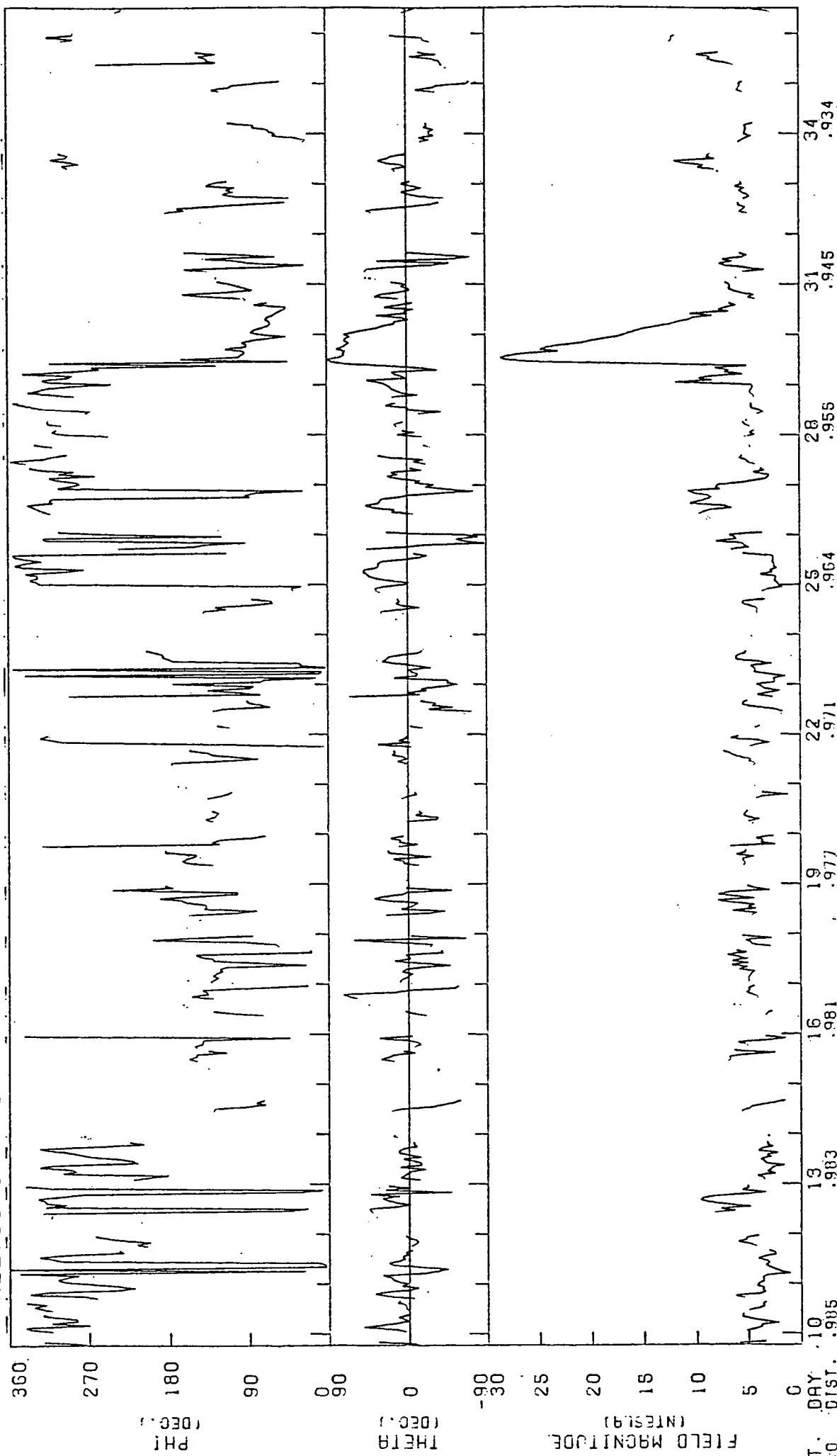


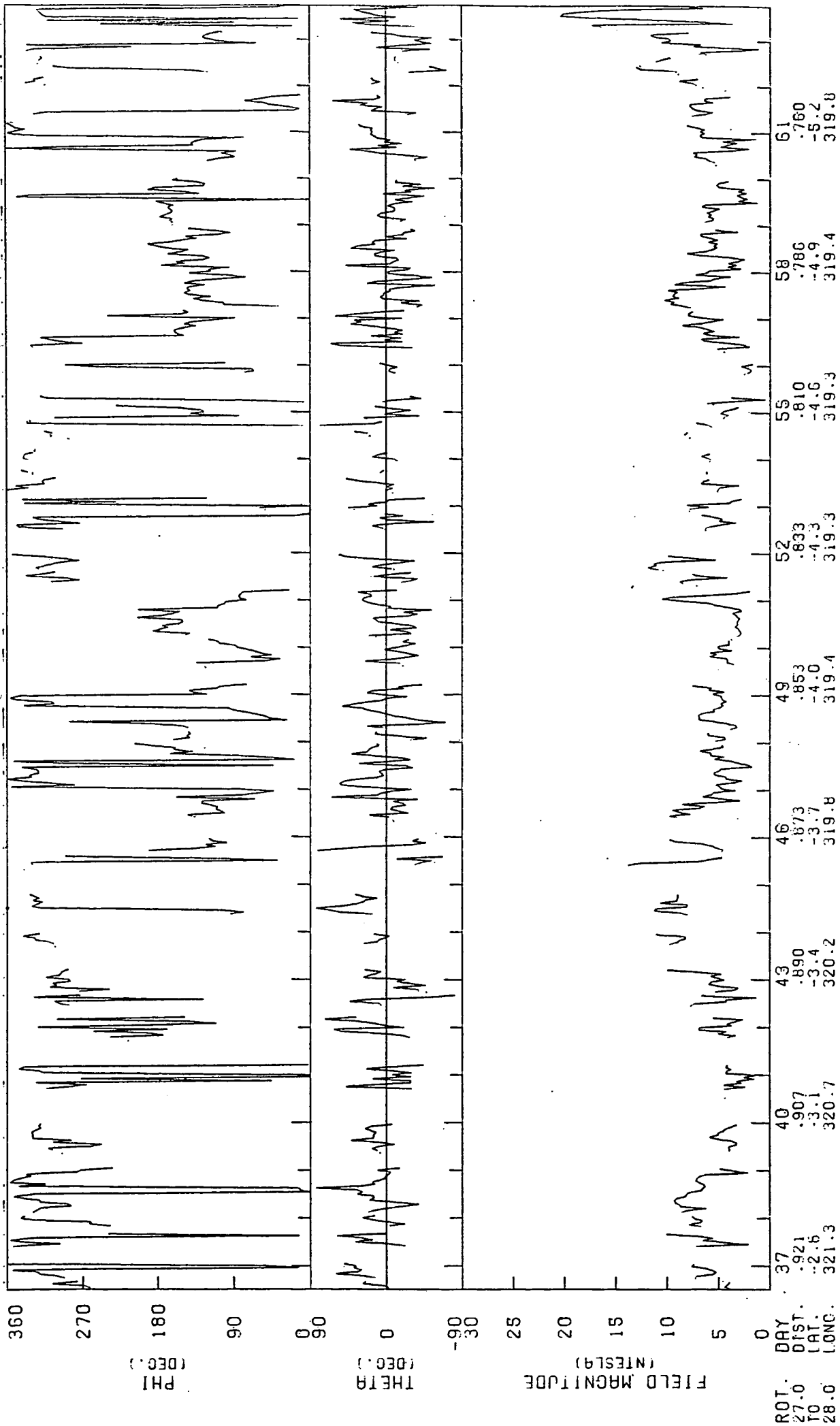
ROT.	DAY	DIST.	LAT.	LONG.
24.0	322	.753	4.8	337.0
20	325	.780	4.5	337.0
20	328	.804	4.1	337.0
20	331	.827	3.8	337.0
20	334	.849	3.5	337.0
20	337	.868	3.2	337.0
20	340	.886	2.9	337.0
20	343	.903	2.6	337.0
20	346	.918	2.3	337.0
20	349	.931	2.0	337.0



YEAR 1977

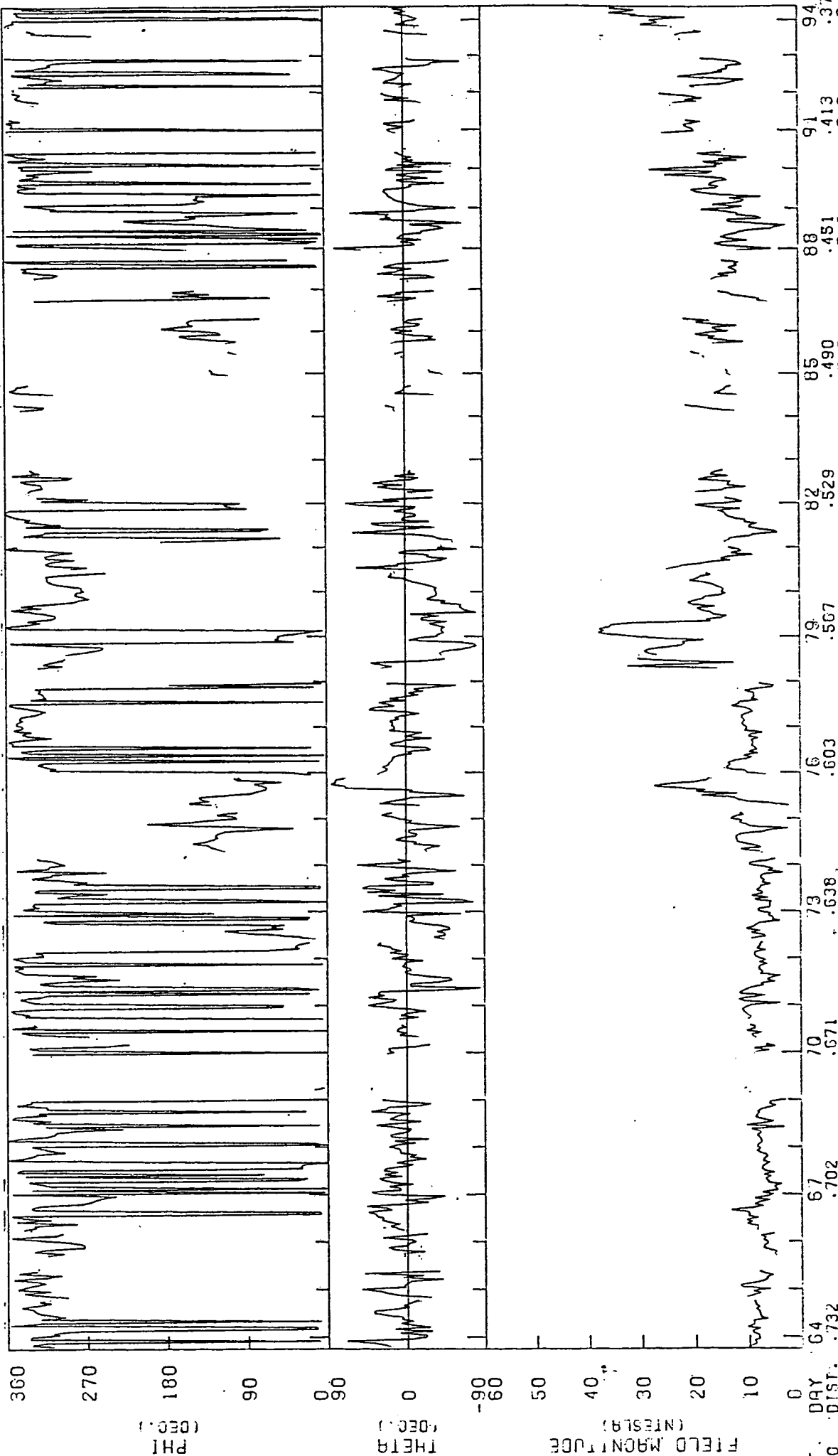
HELIOS 1 EXP 3 (HOURLY AVERAGES)

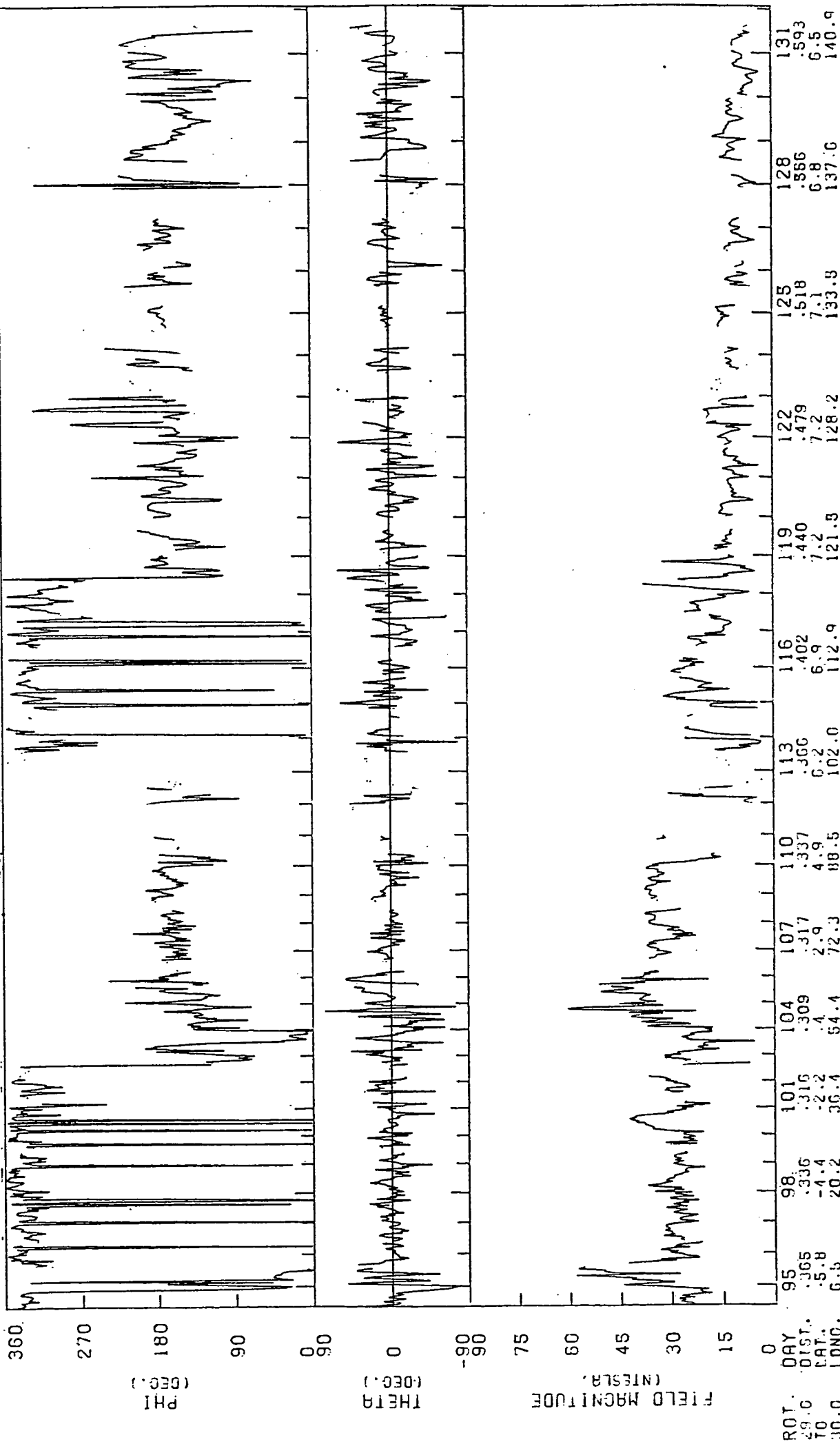


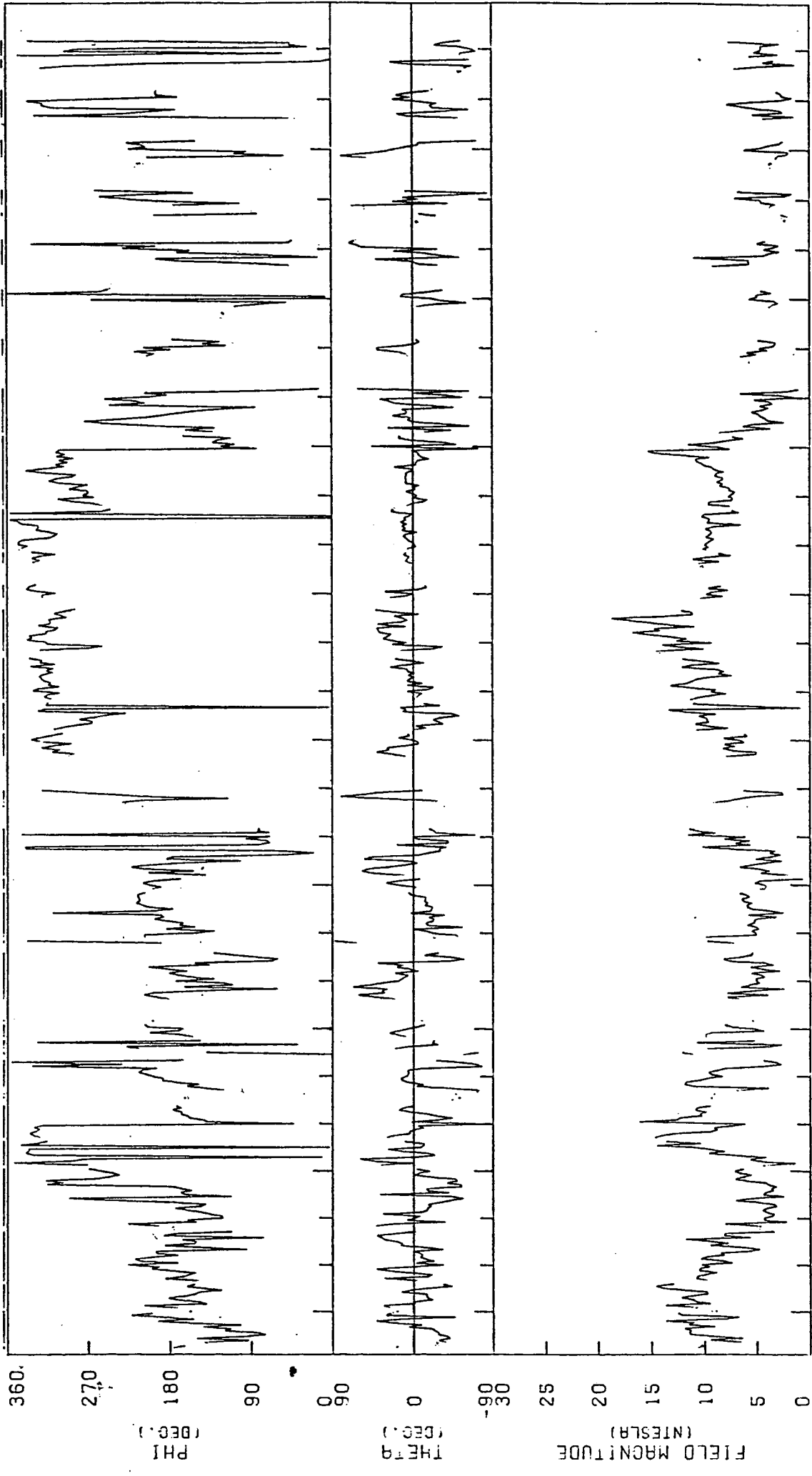


HELIOS 1 EXP 3 (HOURLY AVERAGES)

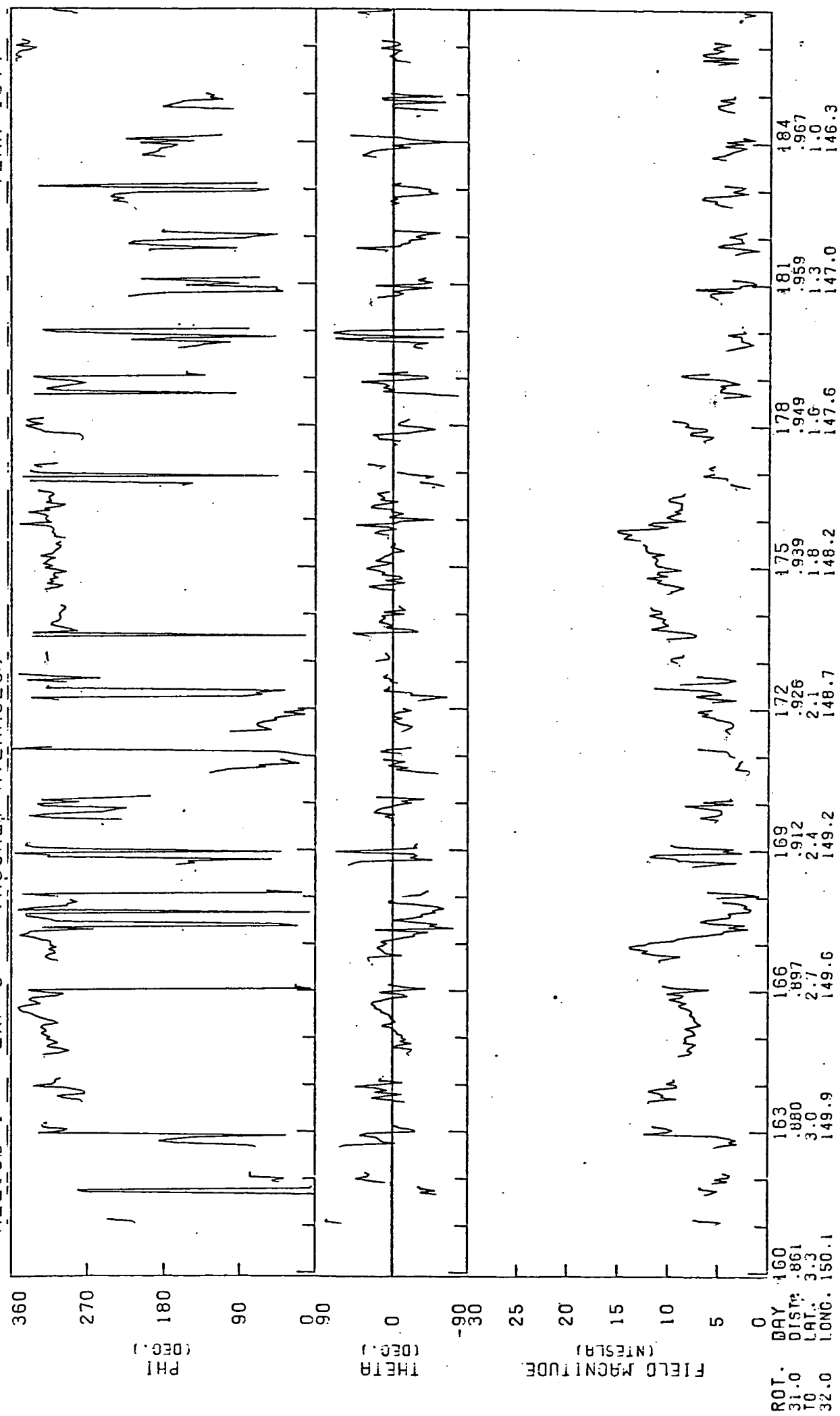
YEAR 1977





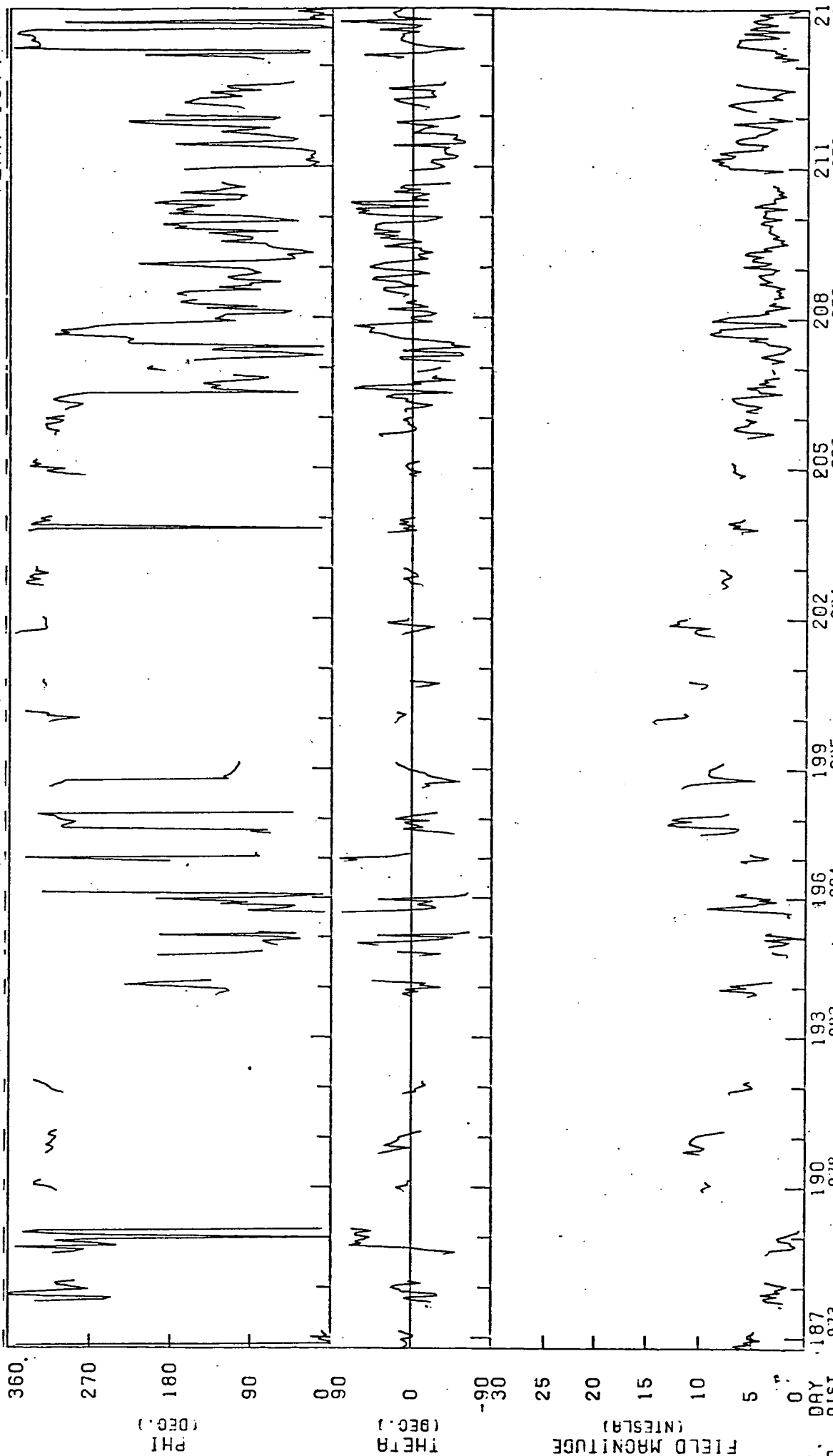


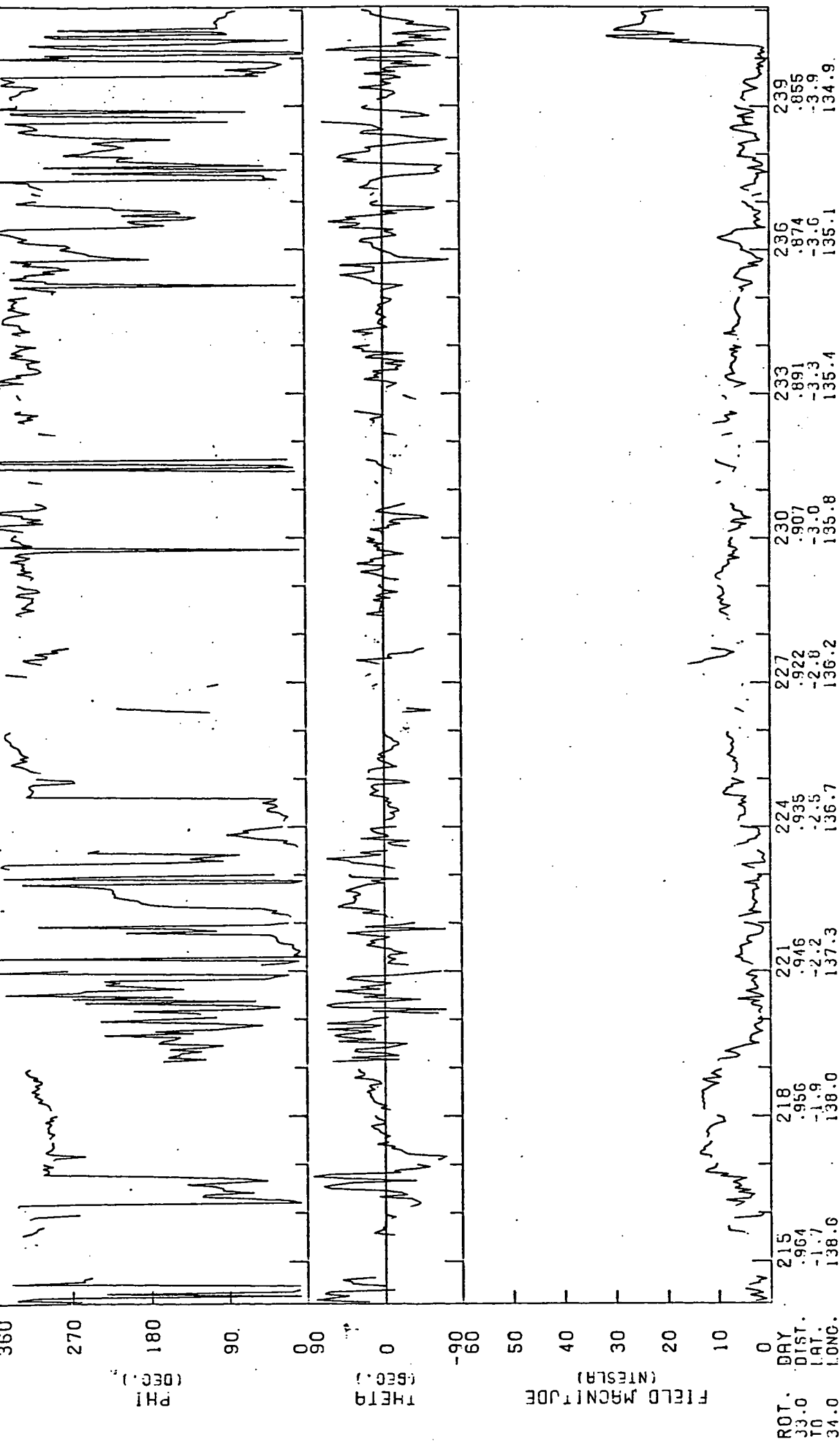
ROT. DAY 133 136 139 142 145 148 151 154 157
 30.0 .616 .651 .683 .714 .743 .770 .819 .841
 TO 6.3 6.0 5.6 5.3 4.9 4.6 4.3 3.9 3.5



HELIOS 1 EXP 3 (HOURLY AVERAGES)

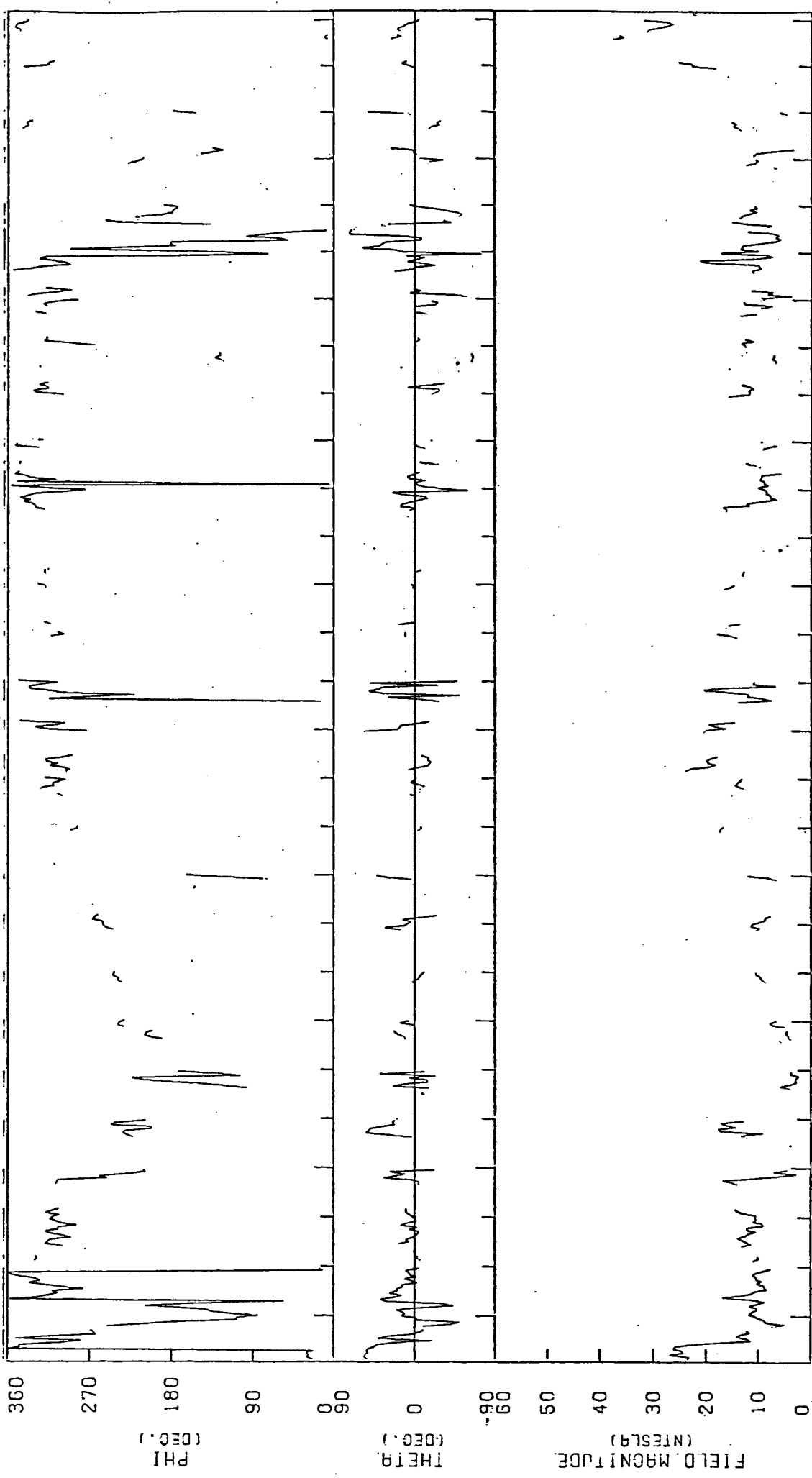
YEAR 1977



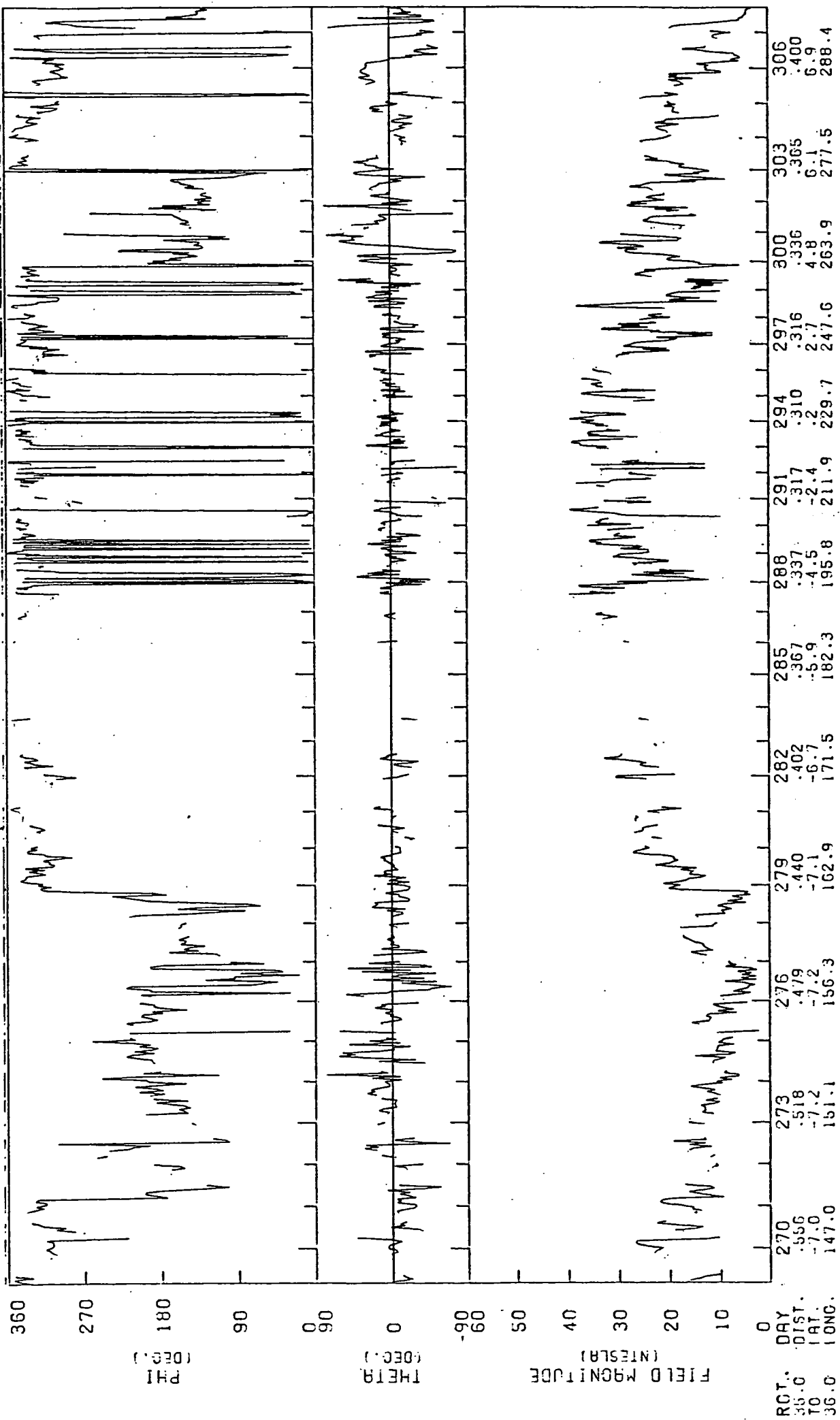


HELIOS 1 EXP 3 (HOURLY AVERAGES)

YEAR 1977

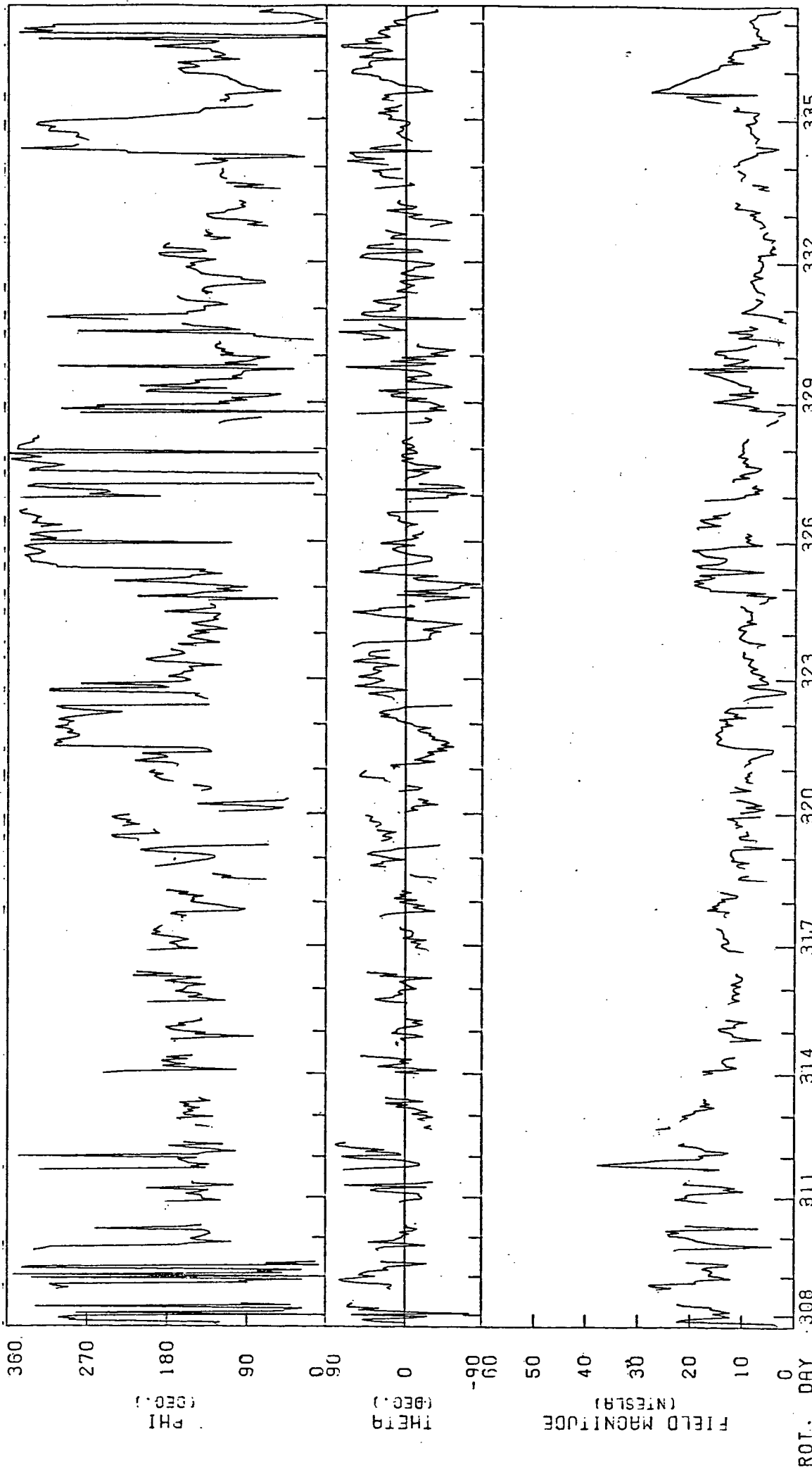


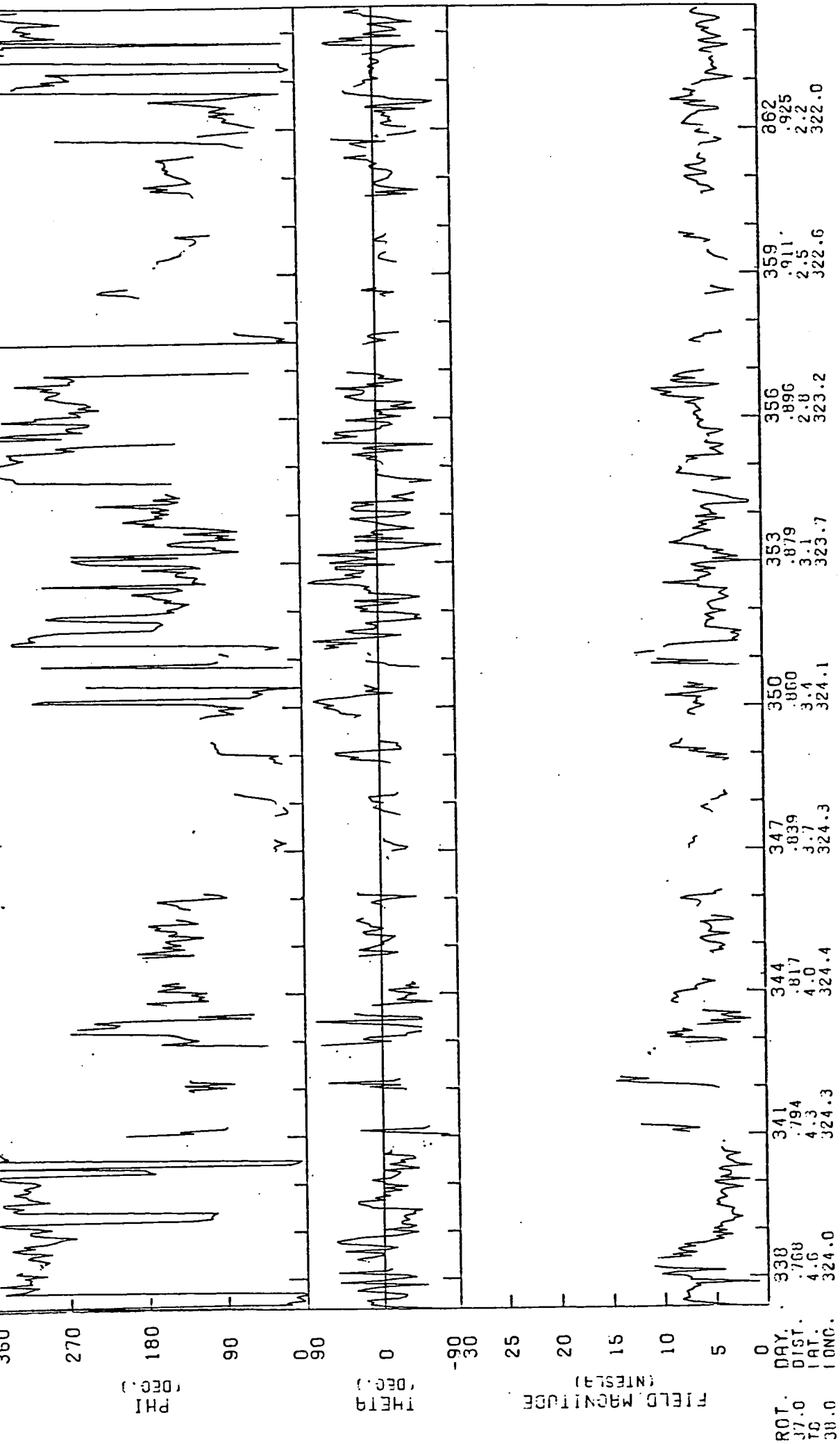
ROT. DAY 34.0 DIST. 242 .834 245 .811 248 .787 251 .761 254 .733 257 .704 260 .673 263 .640 266 .605 269 .569



HELIOS 1 EXP 3 (HOURLY AVERAGES)

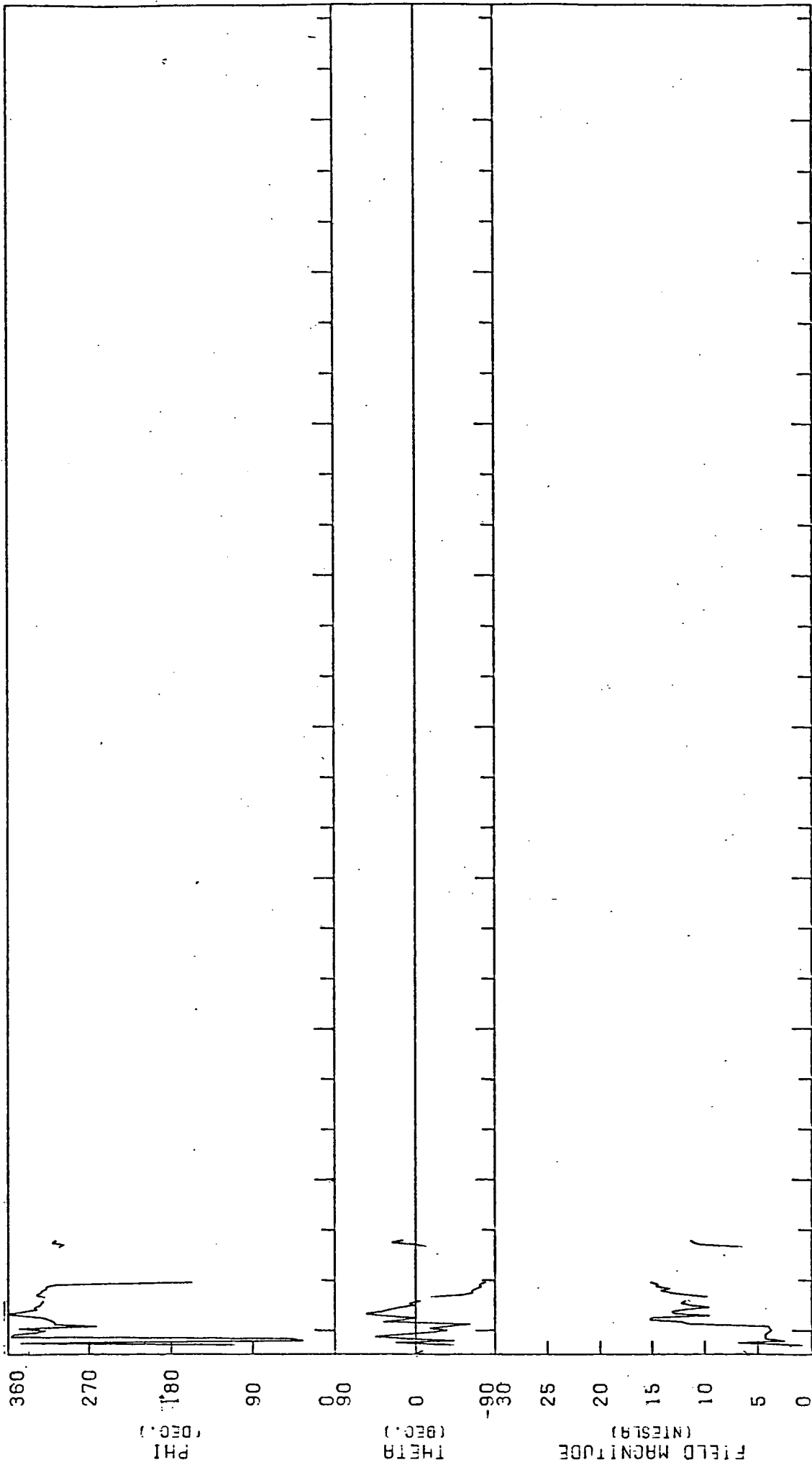
YEAR 1977



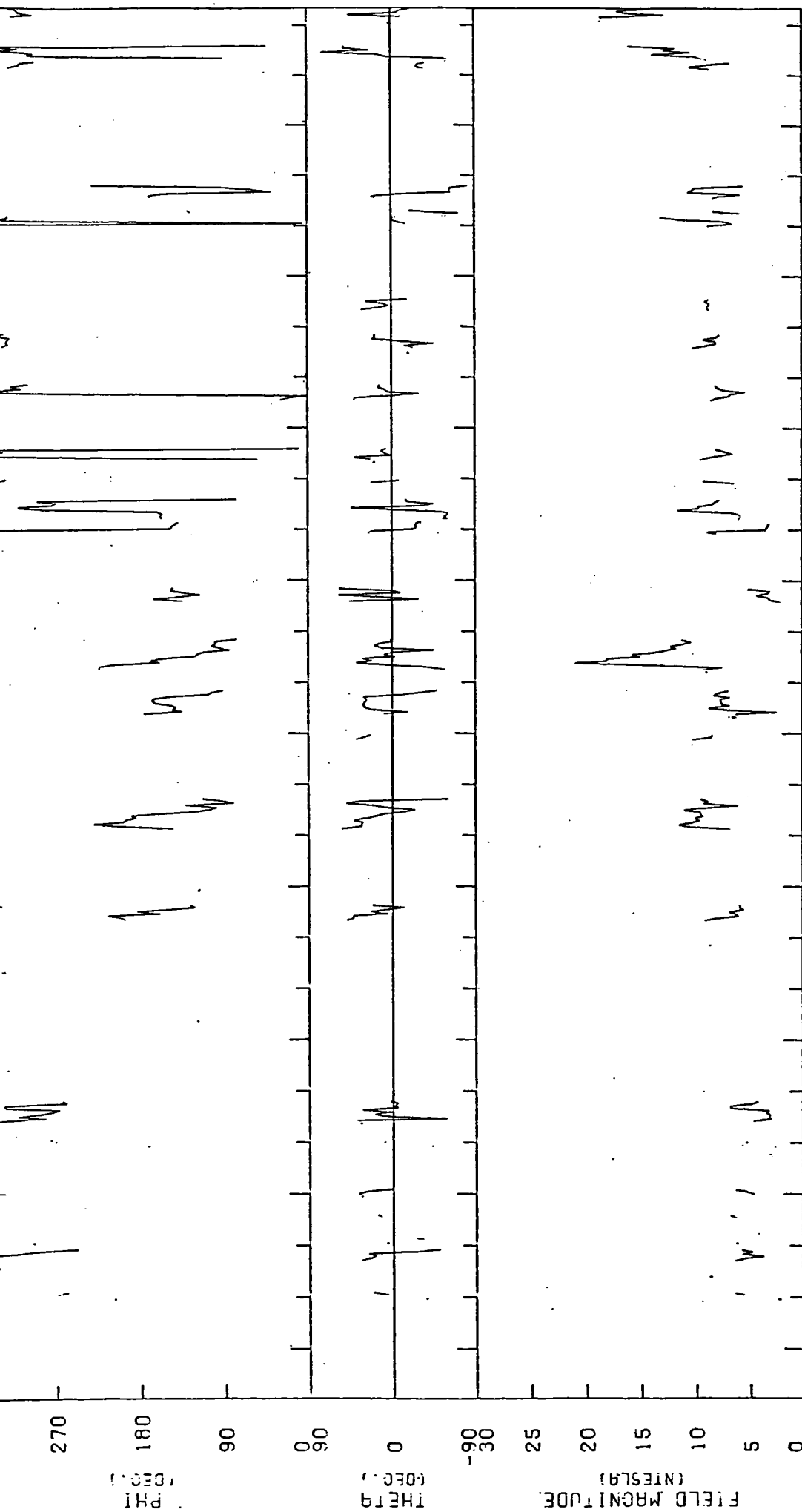


HELIOS 1 EXP 3 (HOURLY AVERAGES)

YEAR 1977



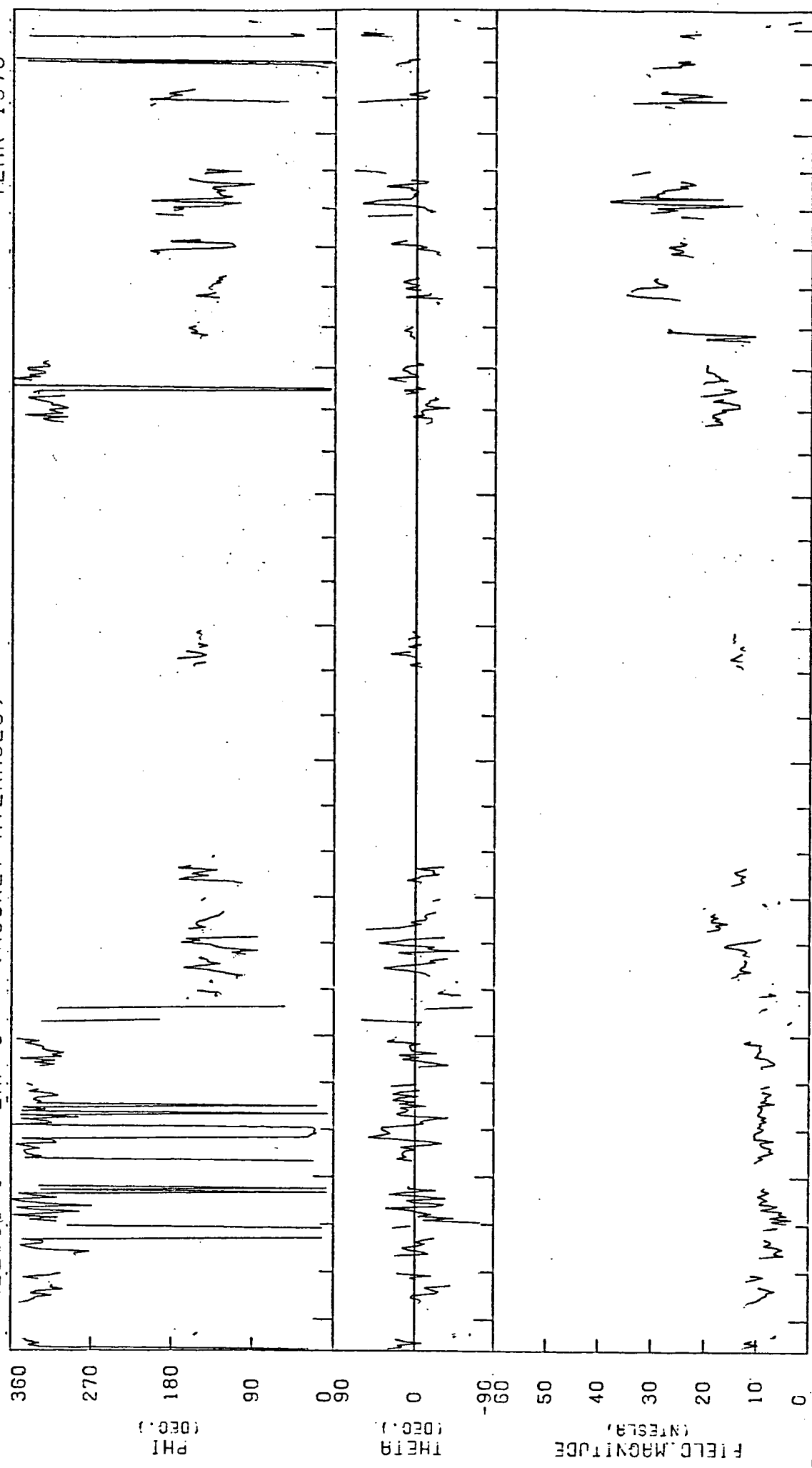
ROT. DAY : 365 DIST. : .930
 30.0 3.0 6.0 9.0 12.0 15.0 18.0 21.0 24.0
 .919 .958 .966 .973 .978 .982 .984 .985



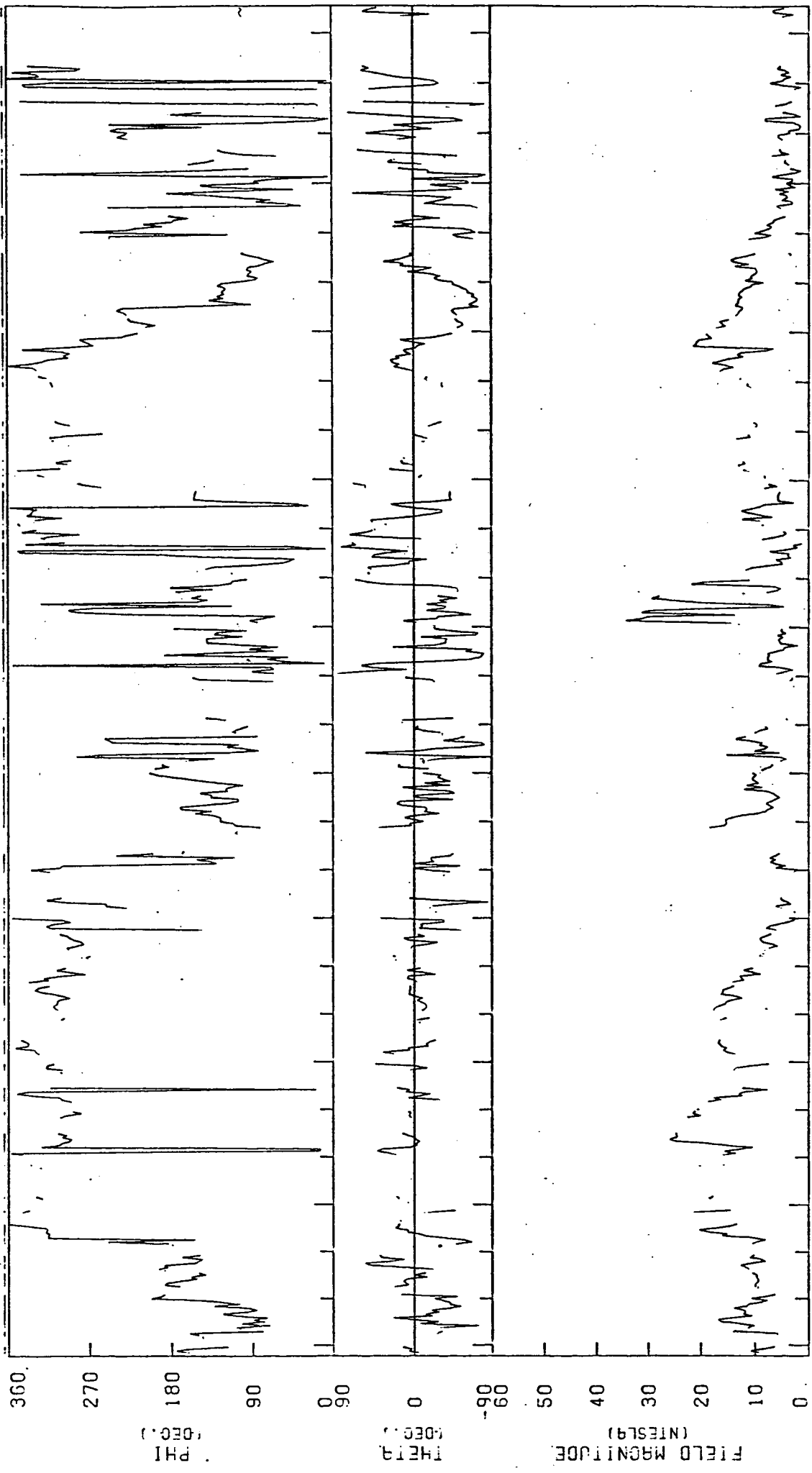
ROT.	DAY	DIST.	TO	LONG.
40.0	54	.913	-2.9	305.8
41.0	57	.898	-3.2	305.2
	60	.881	-3.5	304.8
	63	.862	-3.8	304.4
	66	.842	-4.1	304.2
	69	.820	-4.4	304.1
	72	.797	-4.7	304.3
	75	.771	-5.0	304.6
	78	.744	-5.3	305.1

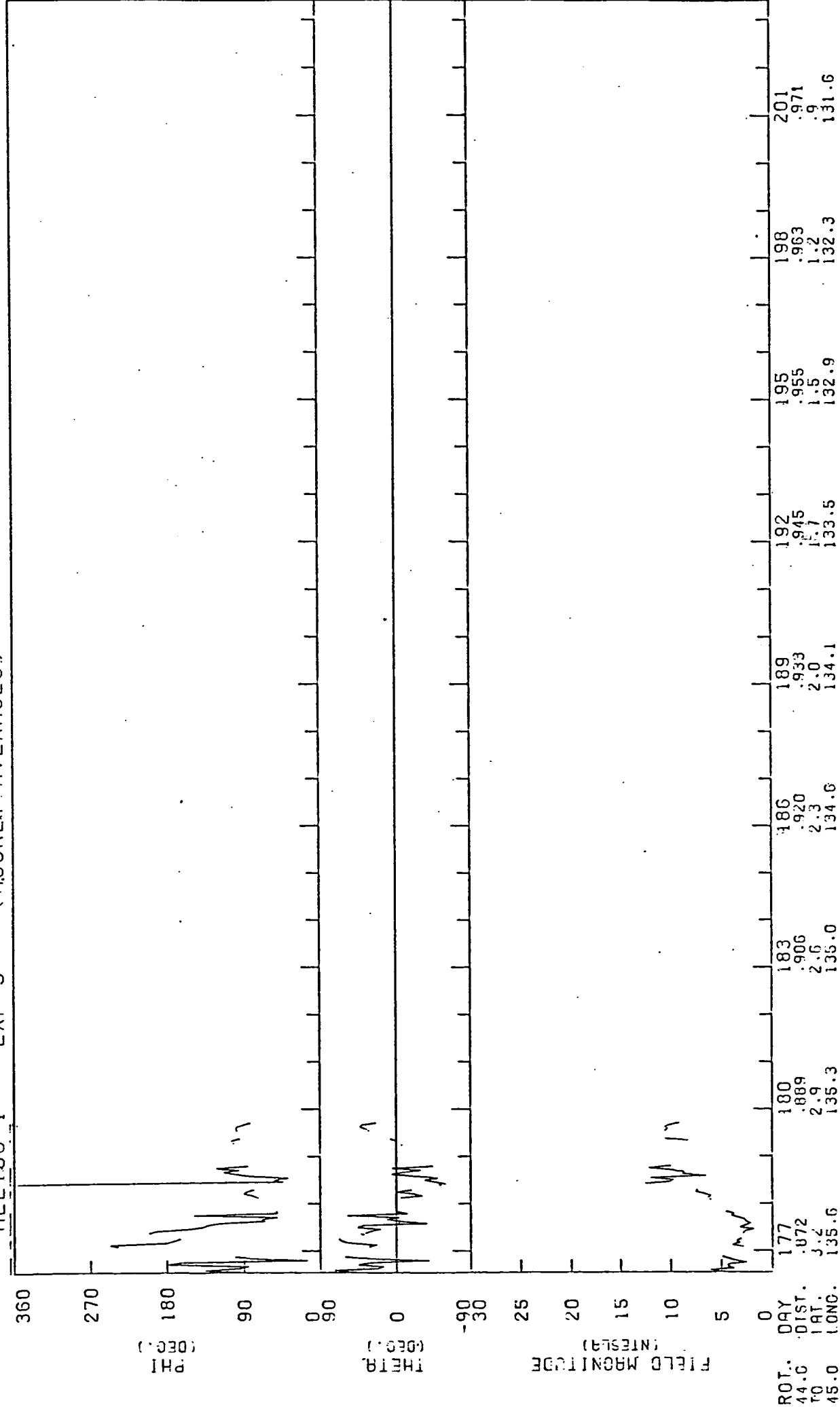
HELIOS 1 EXP 3 (HOURLY AVERAGES)

YEAR 1978



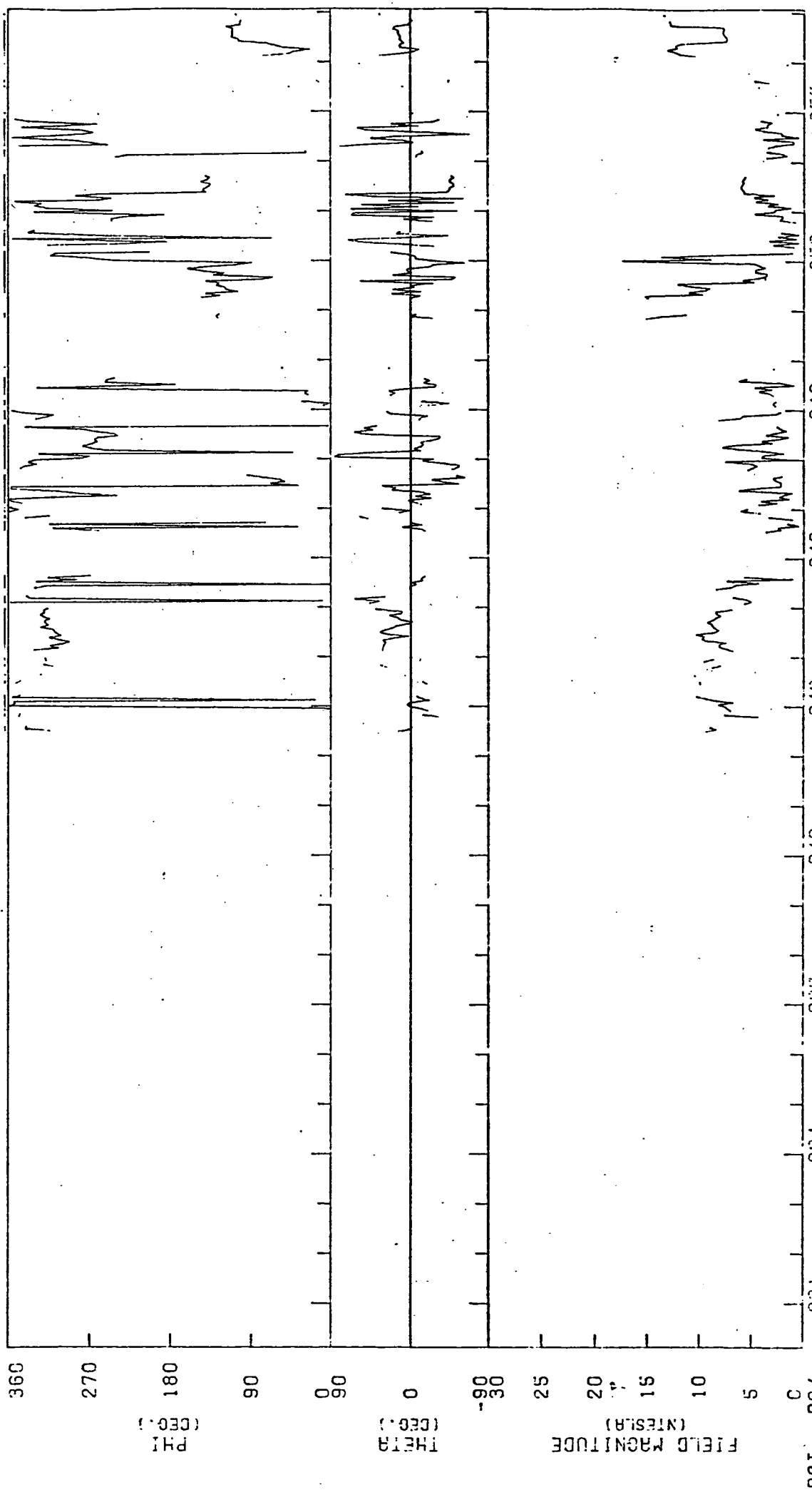
ROT.	DAY	DIST.	LAT.	111	108	105	102	99	96	93	90	87	84	81
41.0				.358	.392	.429	.468	.508	.546	.583	.619	.653	.685	.716
TO				-5.5	-6.5	-7.2	-7.2	-7.2	-7.0	-6.8	-6.5	-6.2	-5.9	-5.6

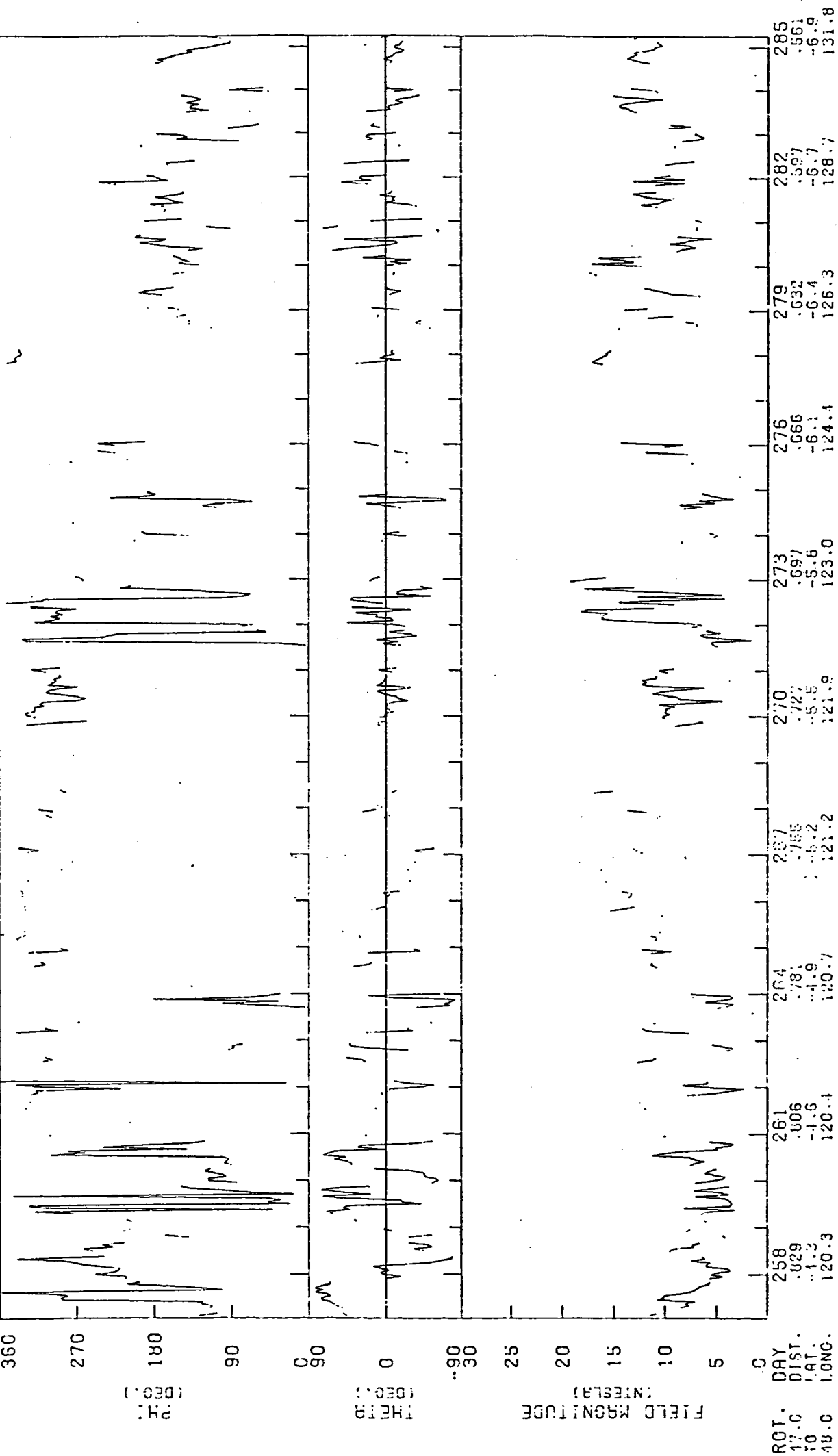




HELIOS 1 EXP 3 (HOURLY AVERAGES)

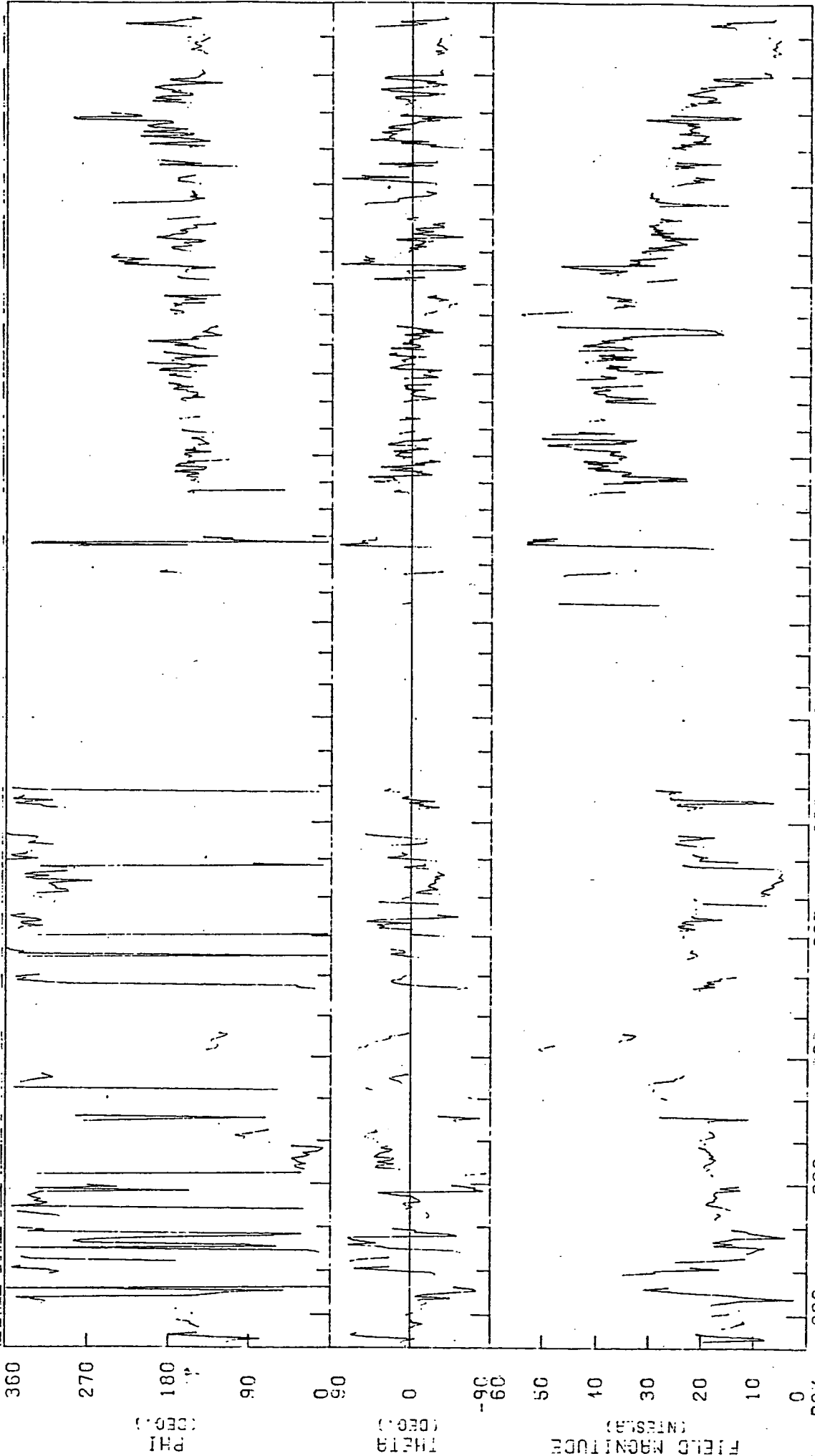
YEAR 1978



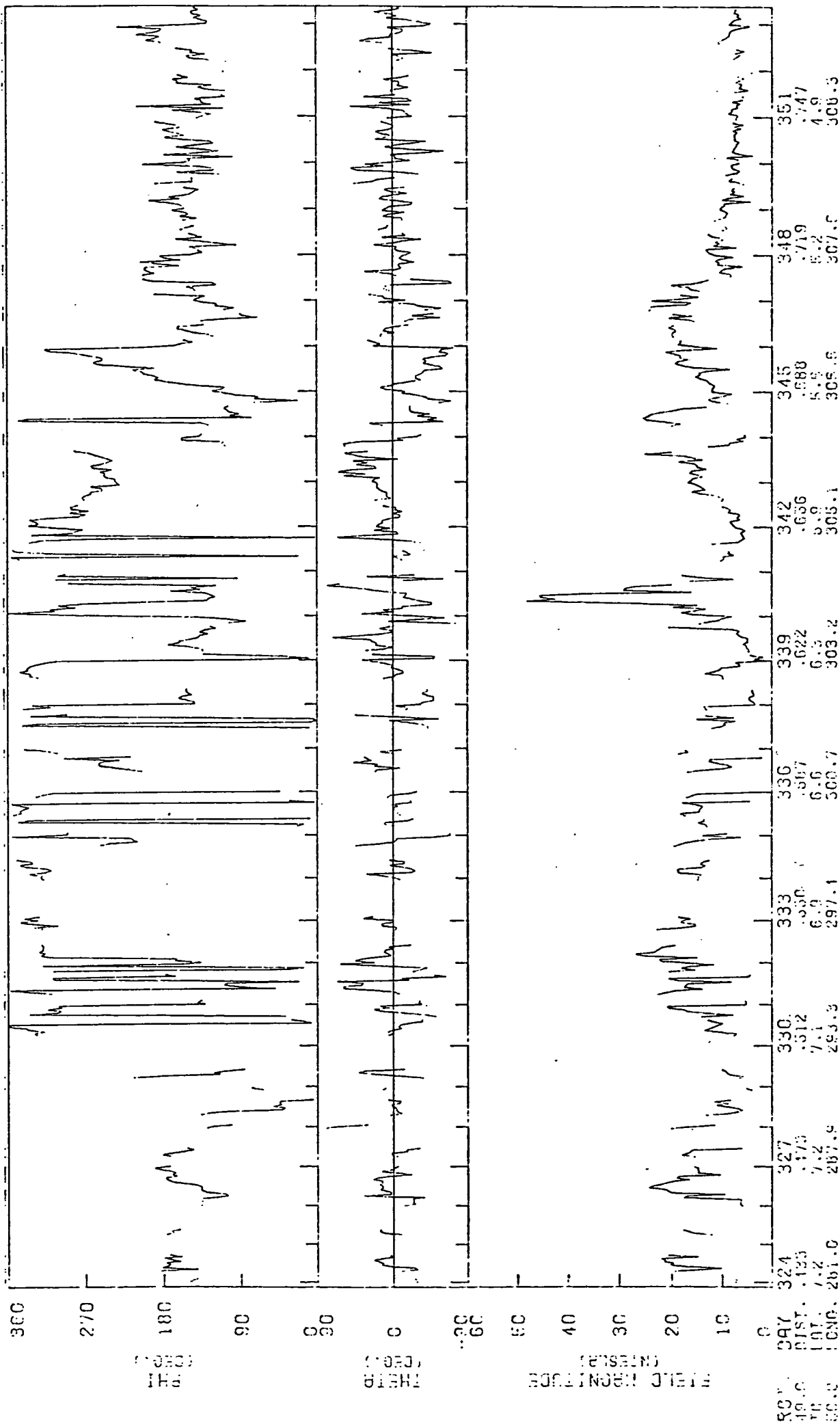


HELICS 1 EXP 3 (HOURLY AVERAGES)

YEAR 1978

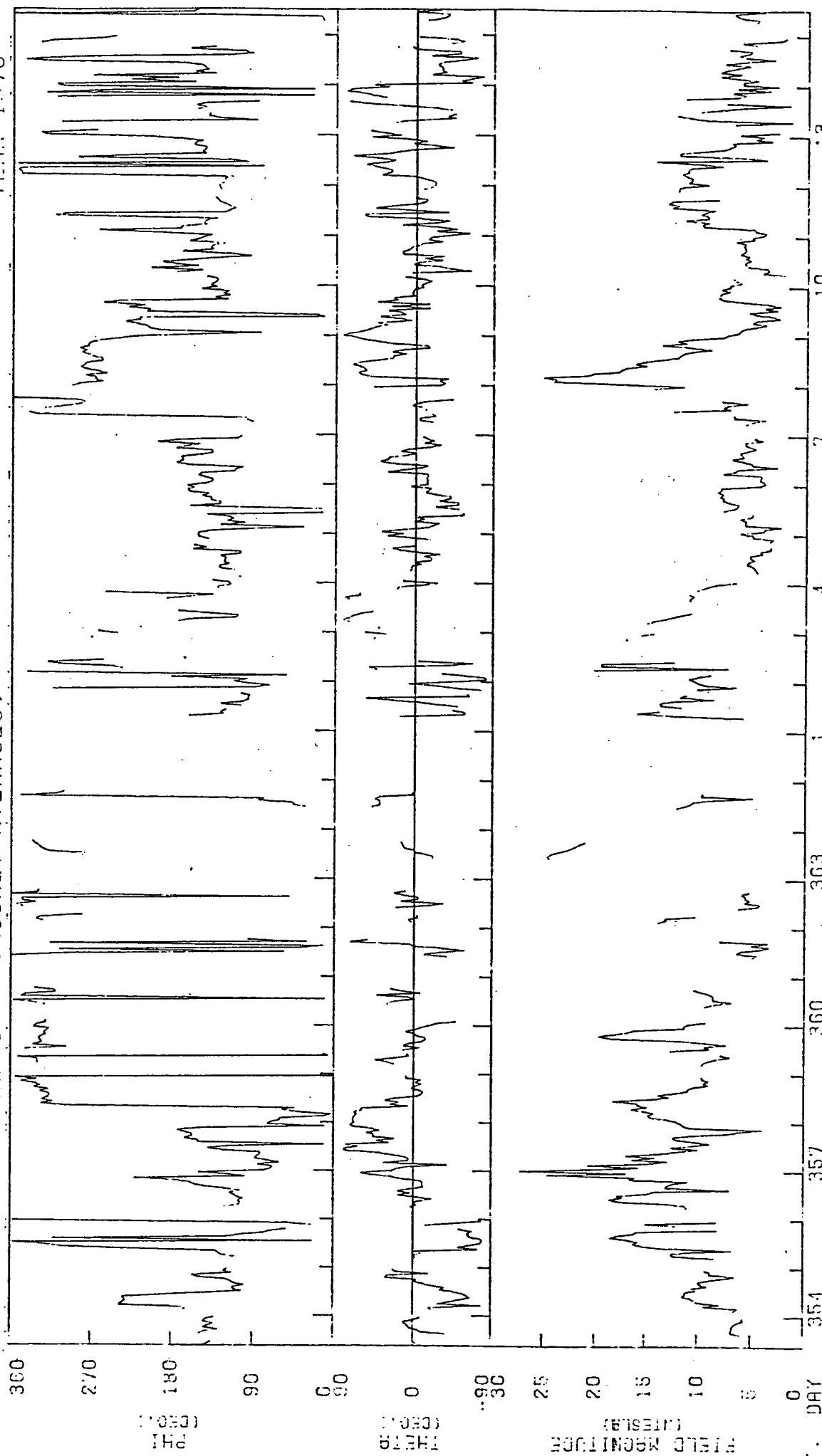


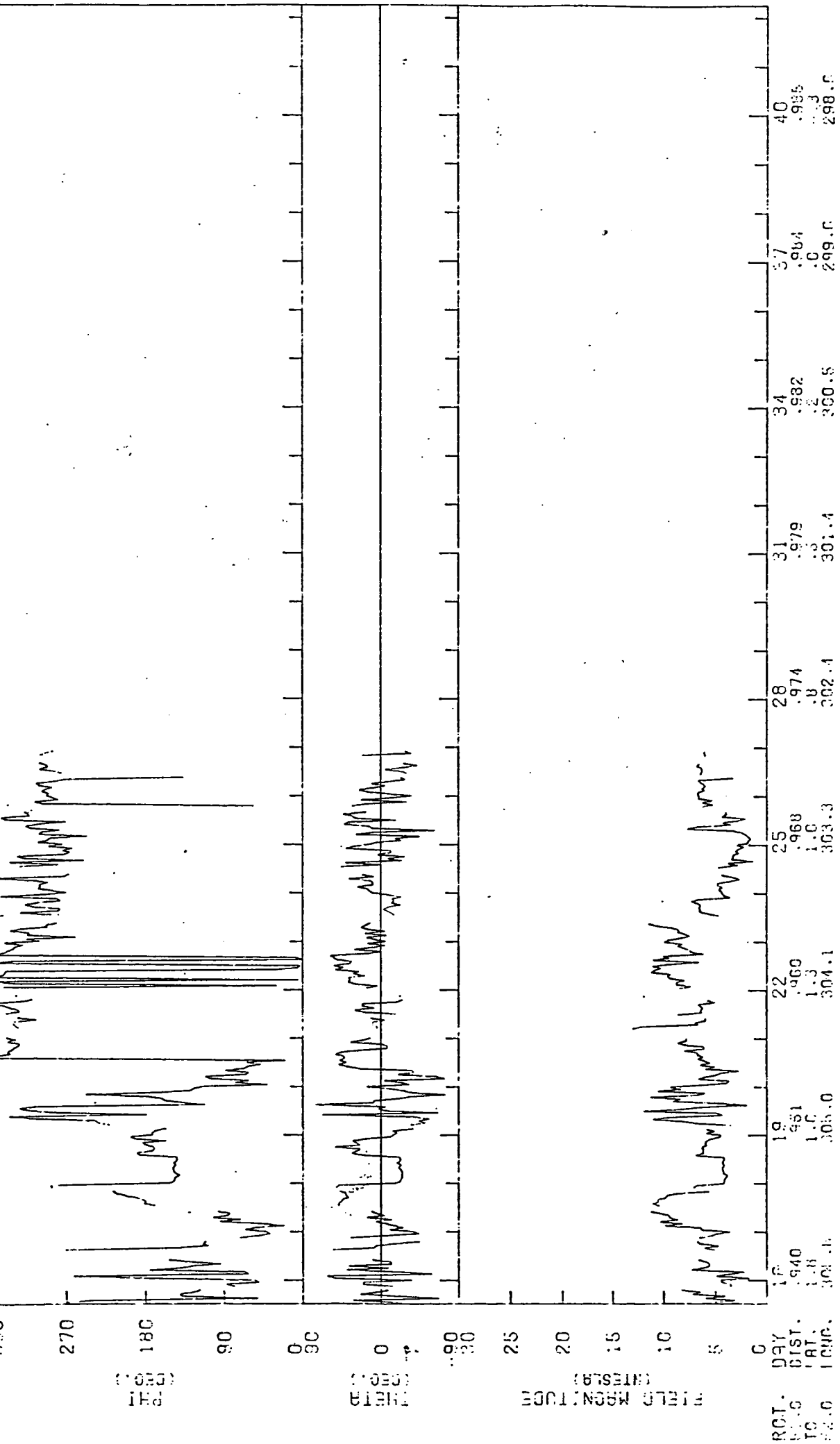
ROT.	DAY	01ST.	TIME
40.0	286	0.48	0.00
	289	0.10	0.00
	292	0.17	0.00
	295	0.32	0.00
	298	0.94	0.00
	301	0.60	0.00
	304	0.32	0.00
	307	0.14	0.00
	310	0.10	0.00
	313	0.32	0.00
	316	0.42	0.00
	319	0.32	0.00
	322	0.08	0.00



HELIOS I EXP 3 (HOURLY AVERAGES)

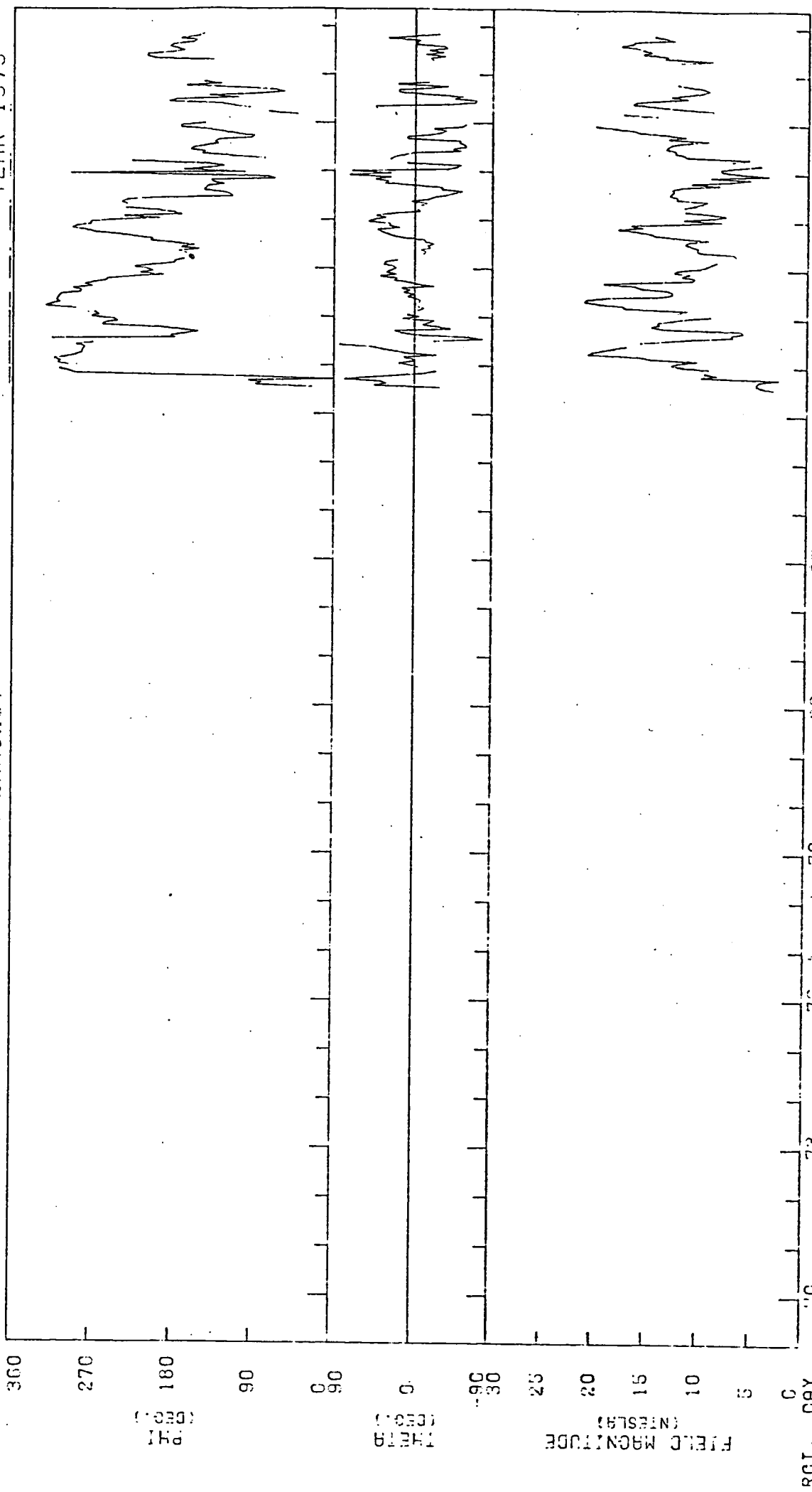
YEAR 1978

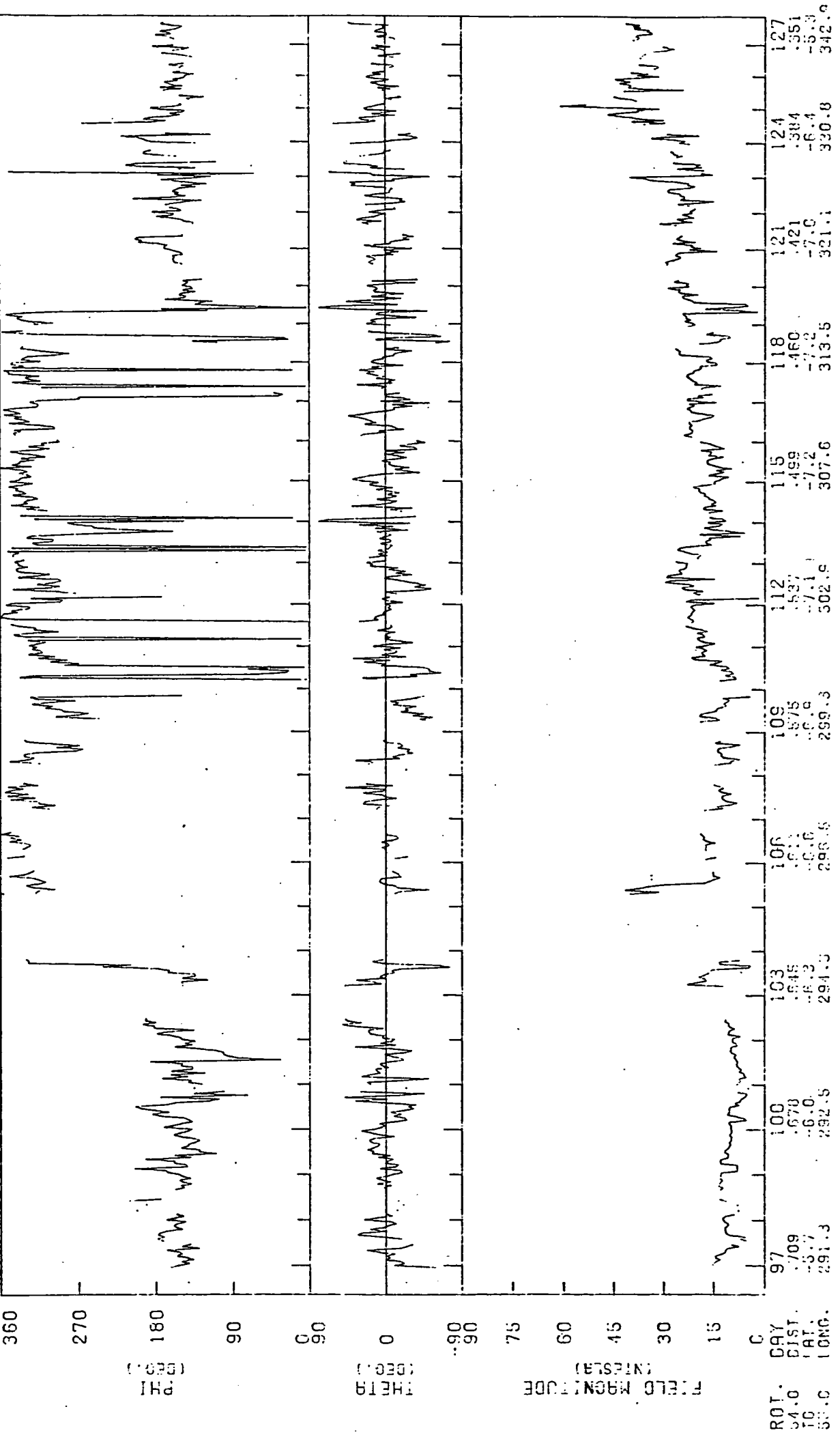




HELIOS 1 EXP 3 (HOURLY AVERAGES)

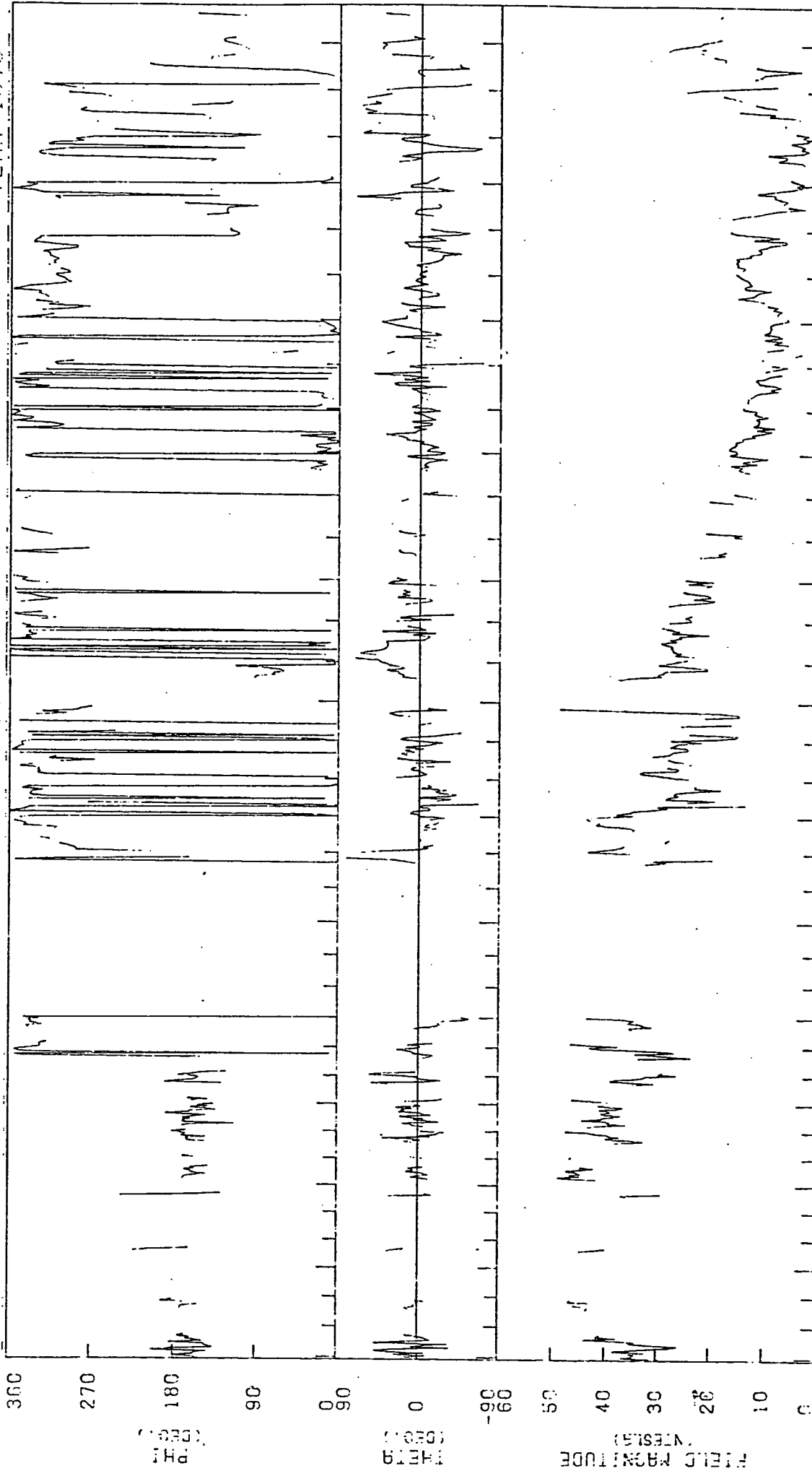
YEAR 1979



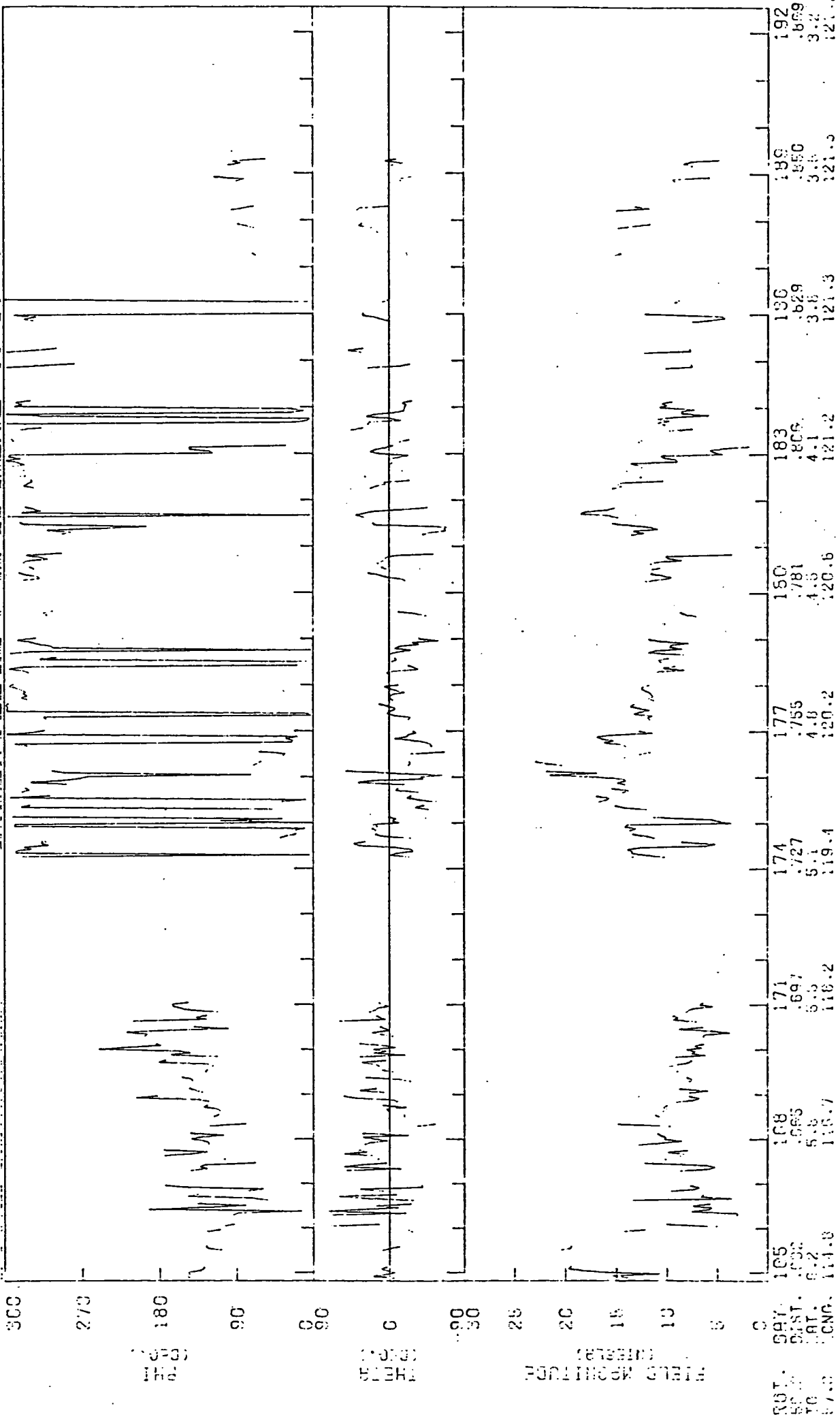


HELIOS 1 EXP 3 (HOURLY AVERAGES)

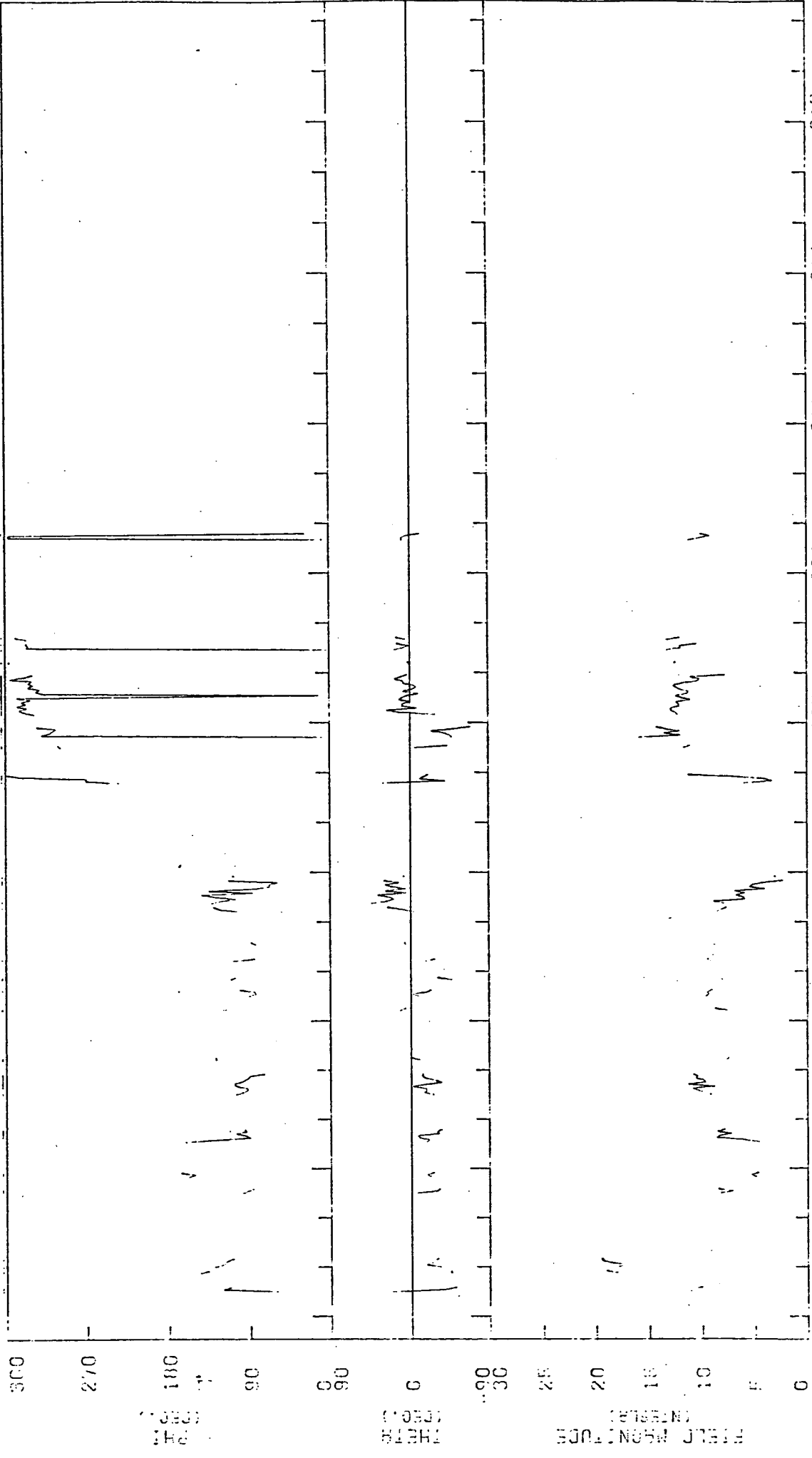
YEAR 1979

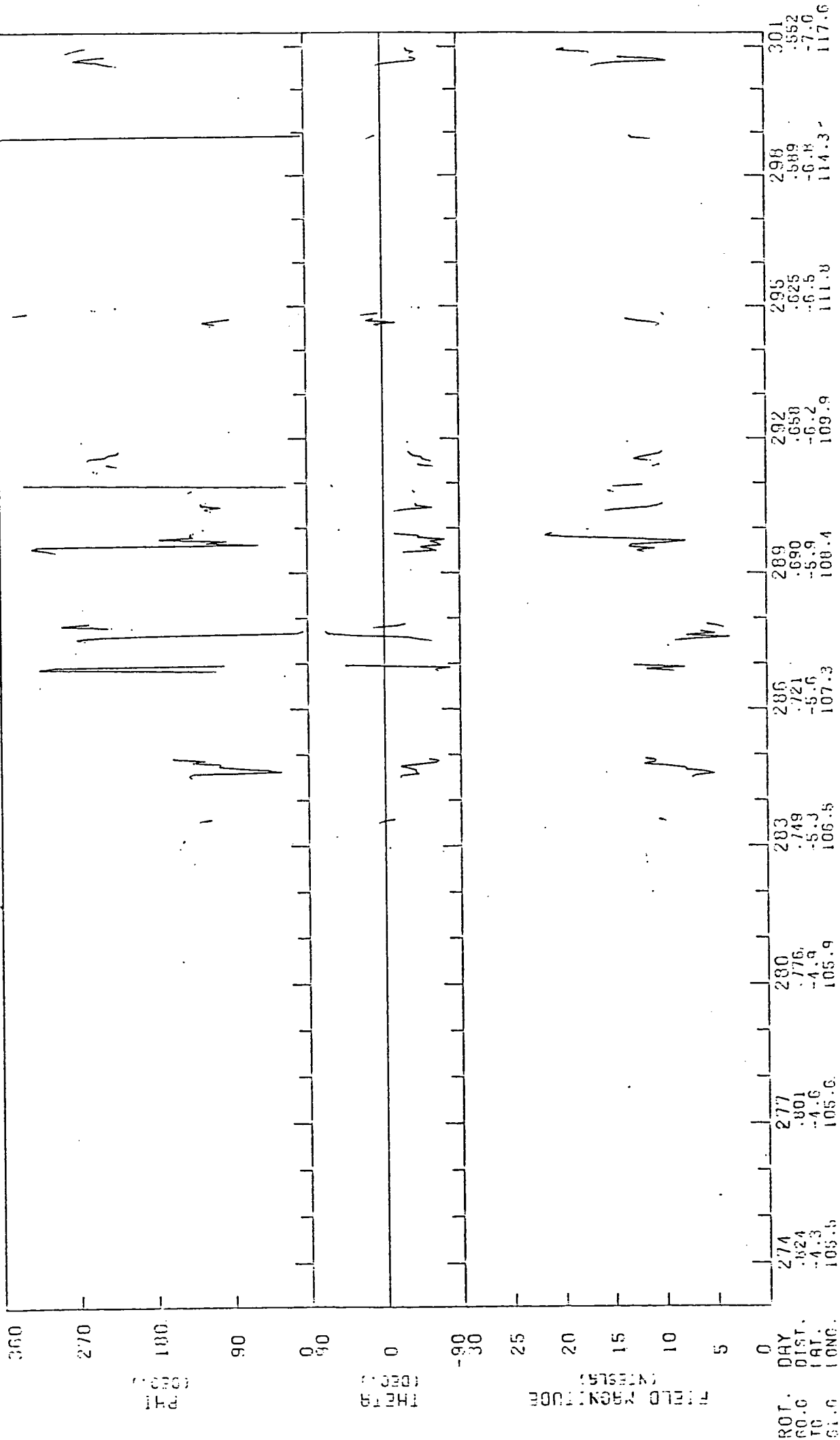


DAY	128	131	134	137	140	143	146	149	152	155	158	161	164
PHASE	342	320	310	314	332	360	384	431	470	509	548	585	621
MAG	42	38	33	30	32	36	39	43	47	51	54	58	62



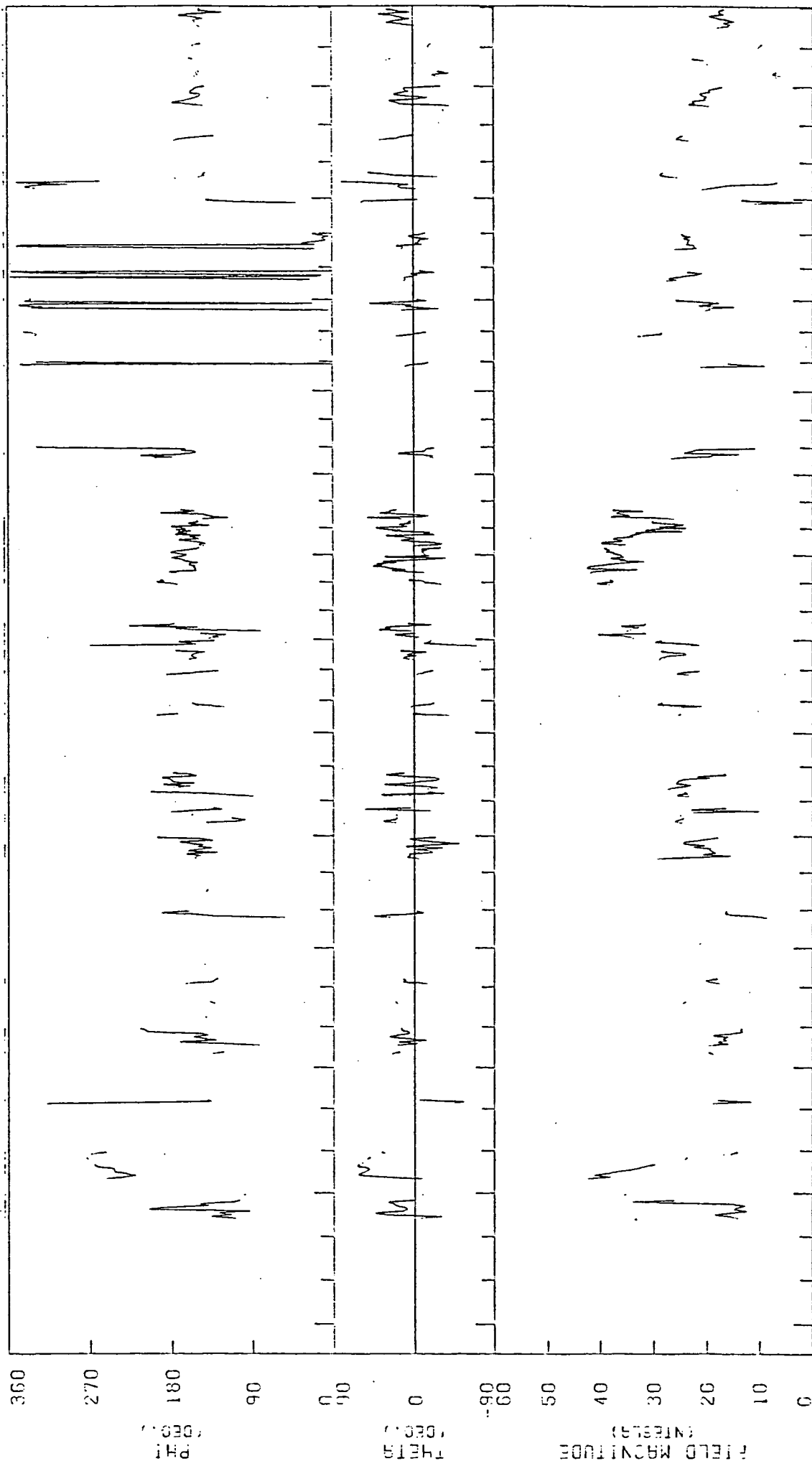
HELICS 1 EXP 3 (HOURLY AVERAGES) YEAR 1979



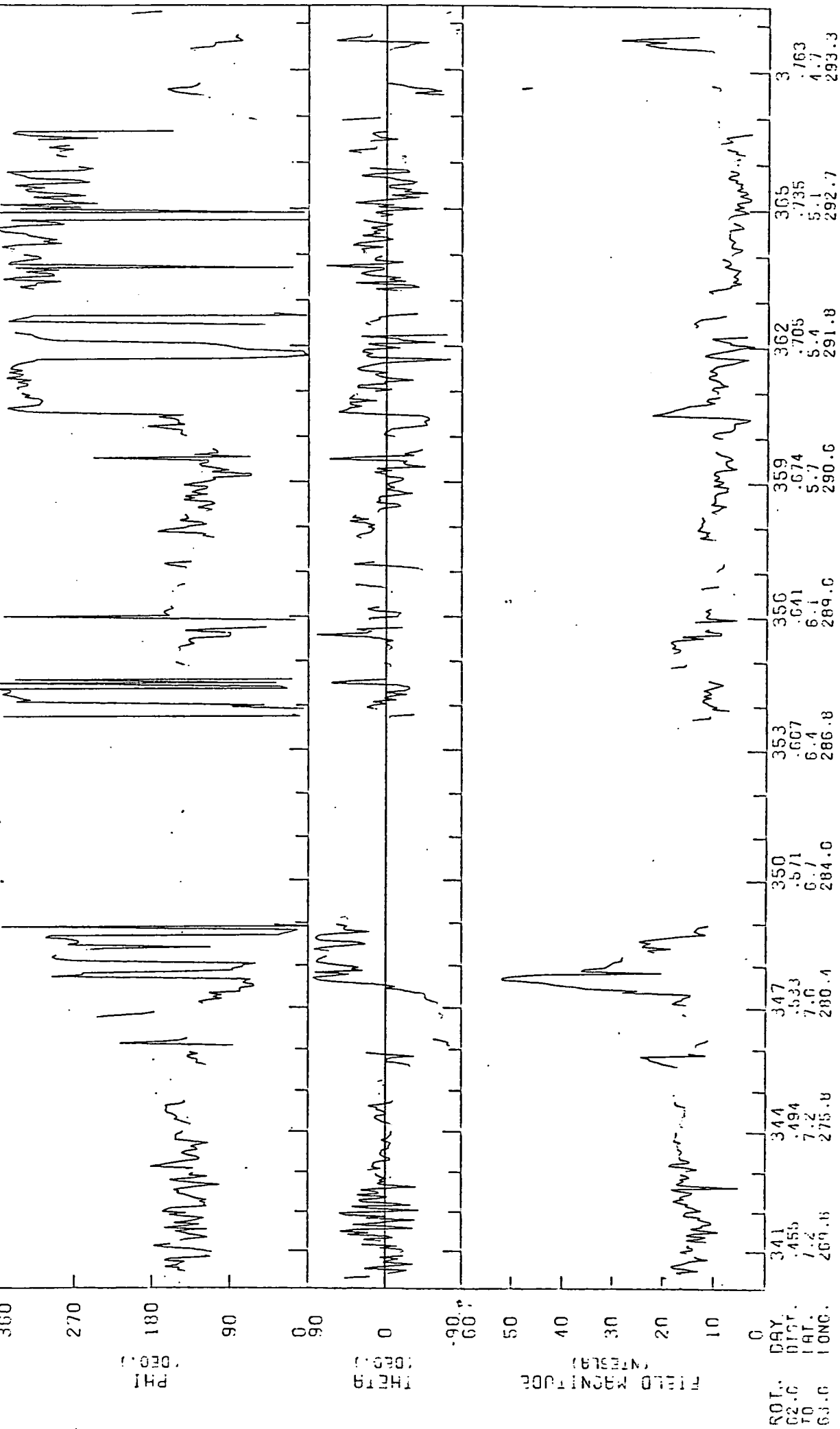


HELIOS 1 EXP 3 (HOURLY AVERAGES)

YEAR 1979

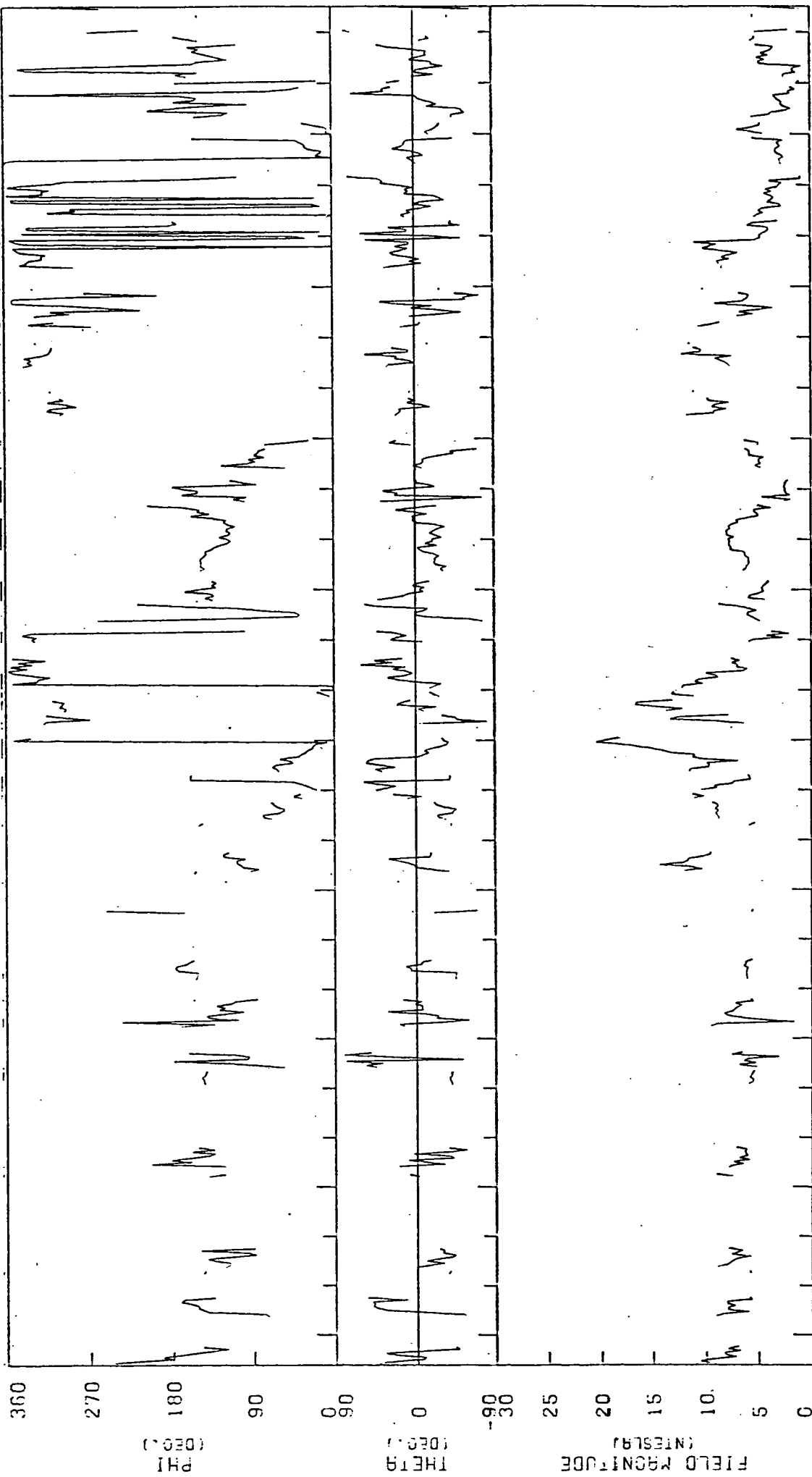


ROT.	DAY.	1979	302	305	308	311	314	317	320	323	326	329	332	335	338
61.6	01ST.		5.40	5.61	4.62	4.23	3.86	3.53	3.27	3.12	3.11	3.24	3.49	3.80	3.88
10	1979		7.1	7.2	7.2	7.0	6.4	5.4	4.6	4.3	4.3	3.7	3.5	6.5	7.1



HELIOS 1 EXP 3 (HOURLY AVERAGES)

YEAR 1980.



ROT. DIST.

5 740

8 805

11 828

14 849

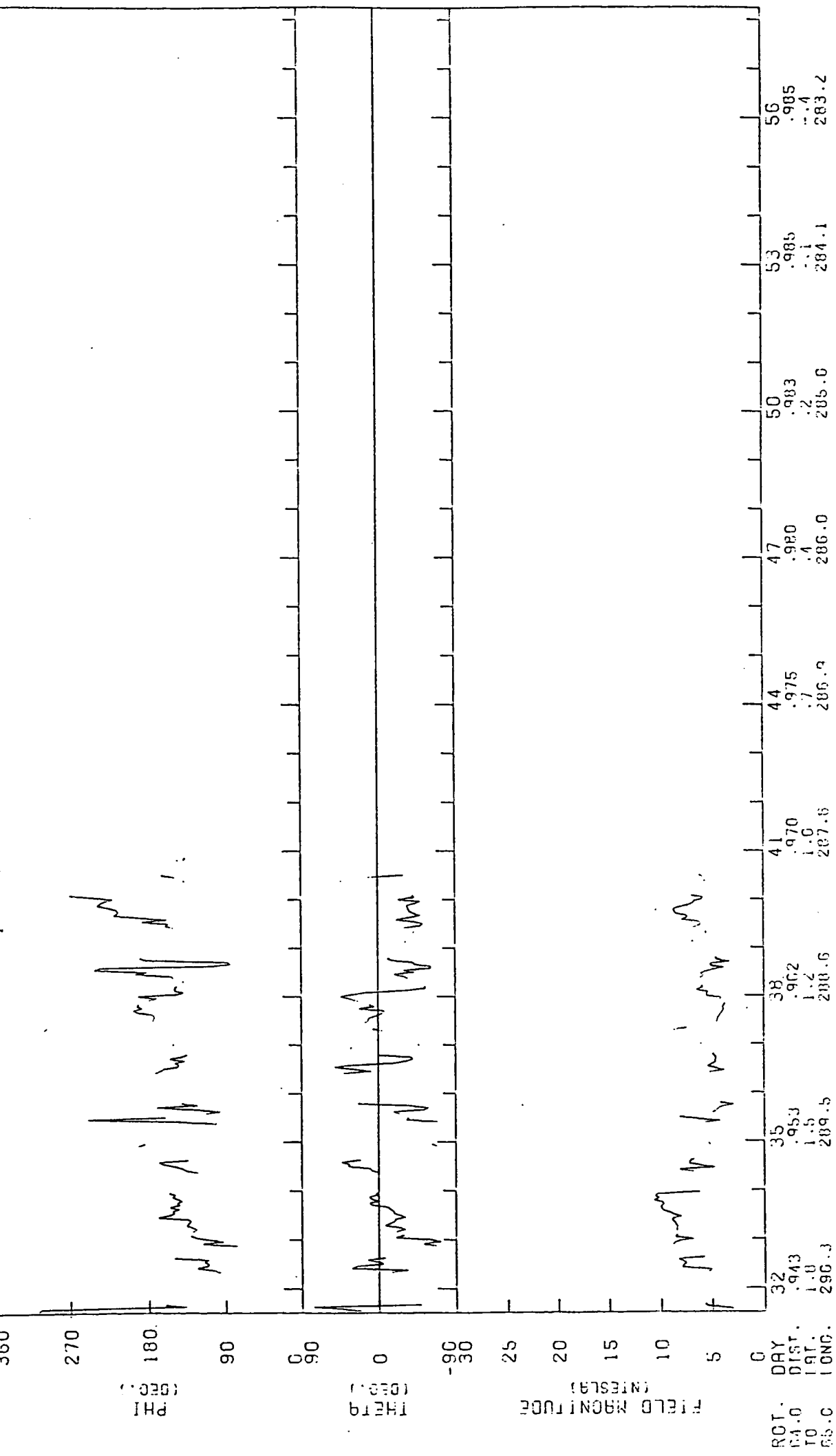
17 868

20 887

23 903

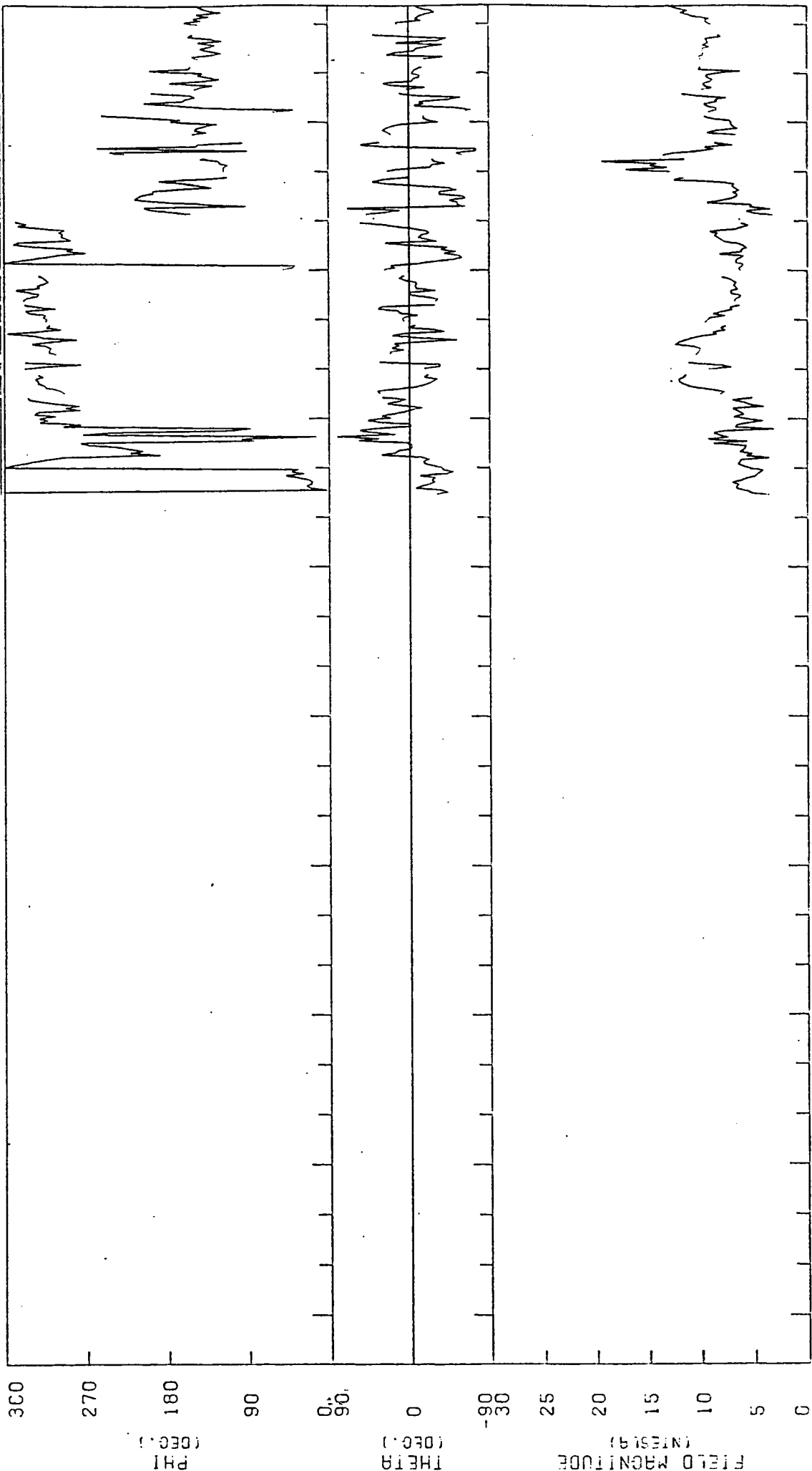
26 918

29 931



HELIOS 1 EXP 3 (HOURLY AVERAGES)

YEAR 1980



ROT.
65.0
TO

DAY

86

89

92

95

98

101

104

107

110

1.0

0.732

-5.1

-4.8

-4.5

-3.9

-3.6

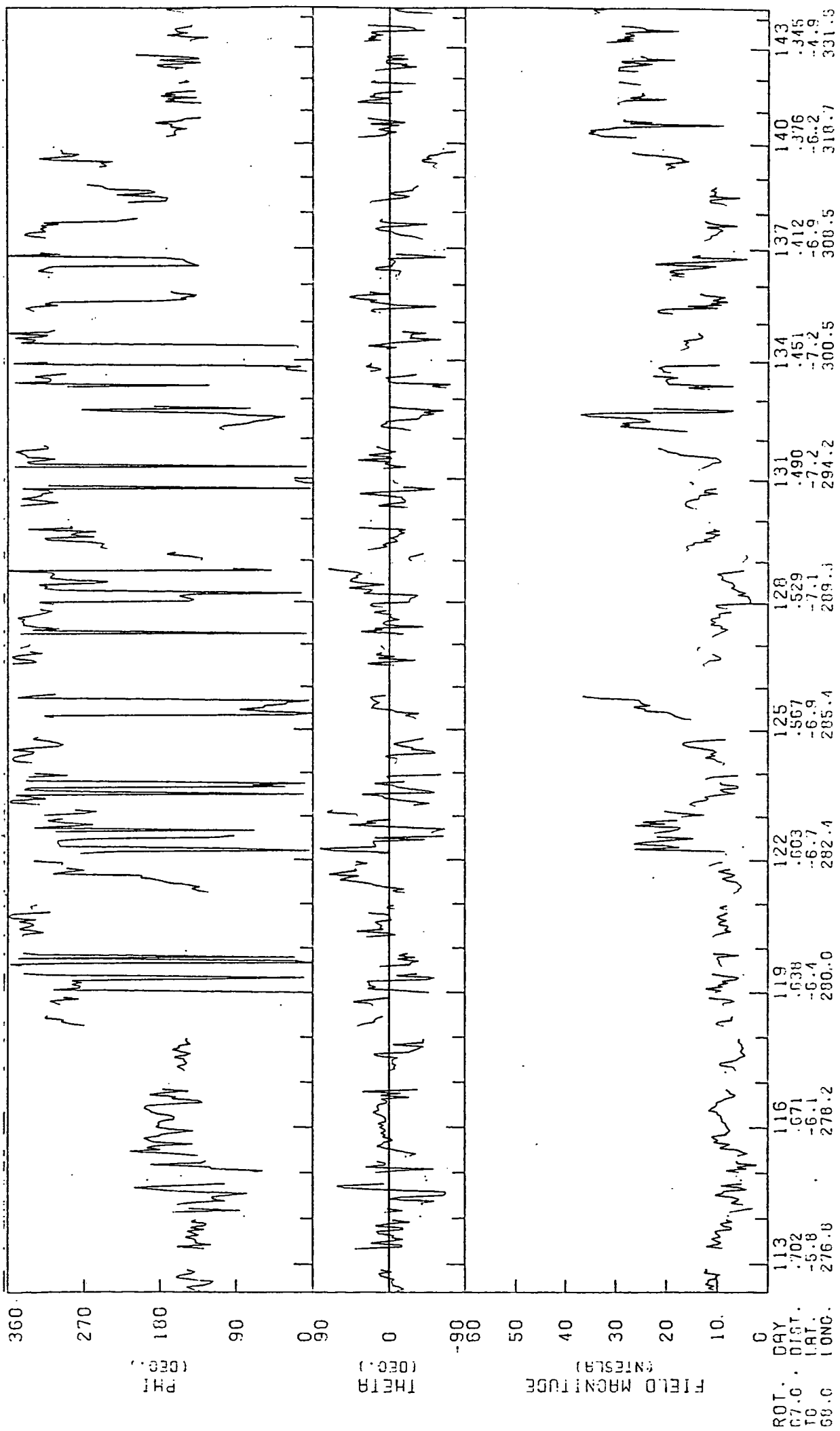
-3.3

-3.0

-2.7

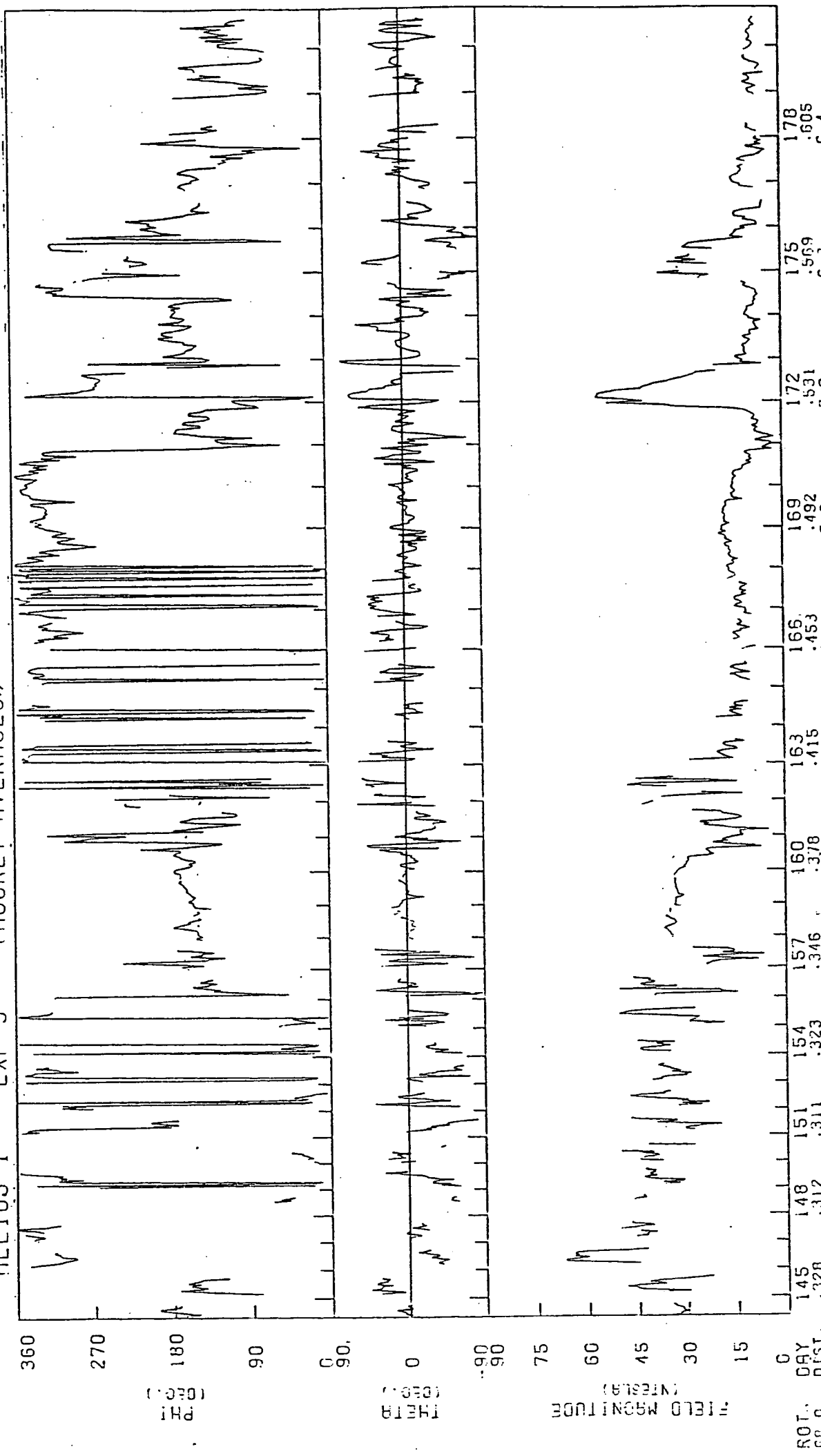
-2.4

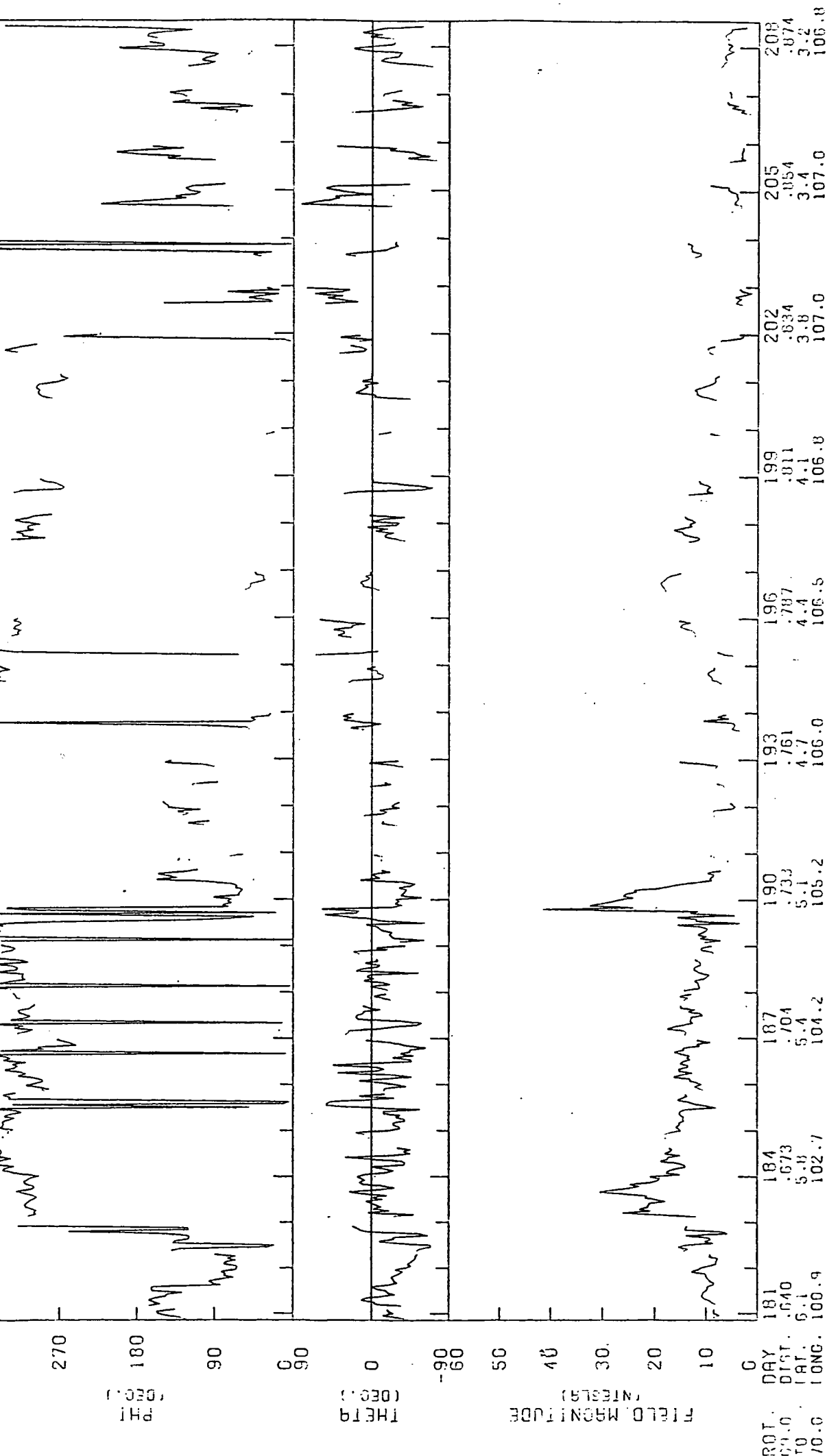
-2.1



YEAR 1980

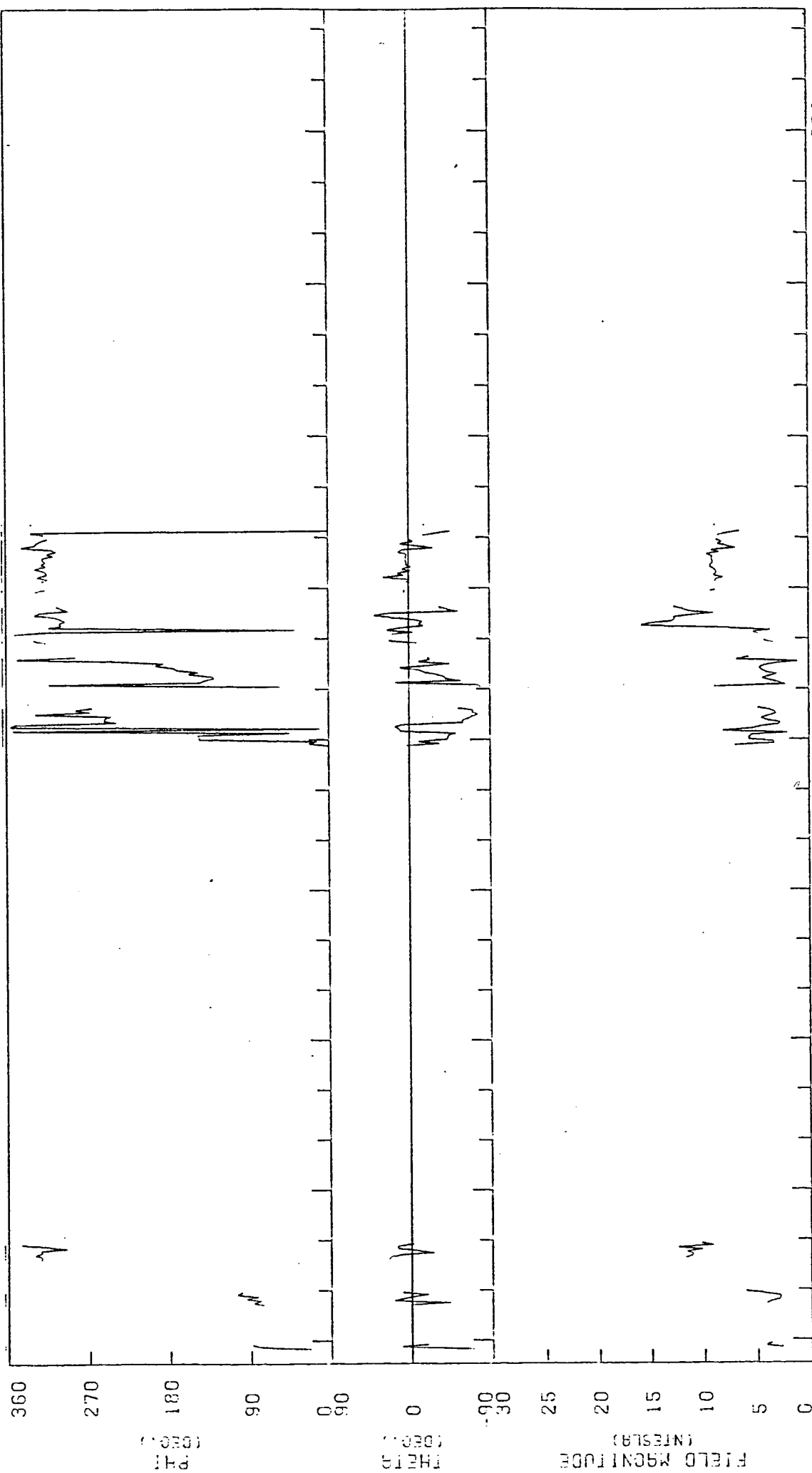
HELIOS 1 EXP 3 (HOURLY AVERAGES.)



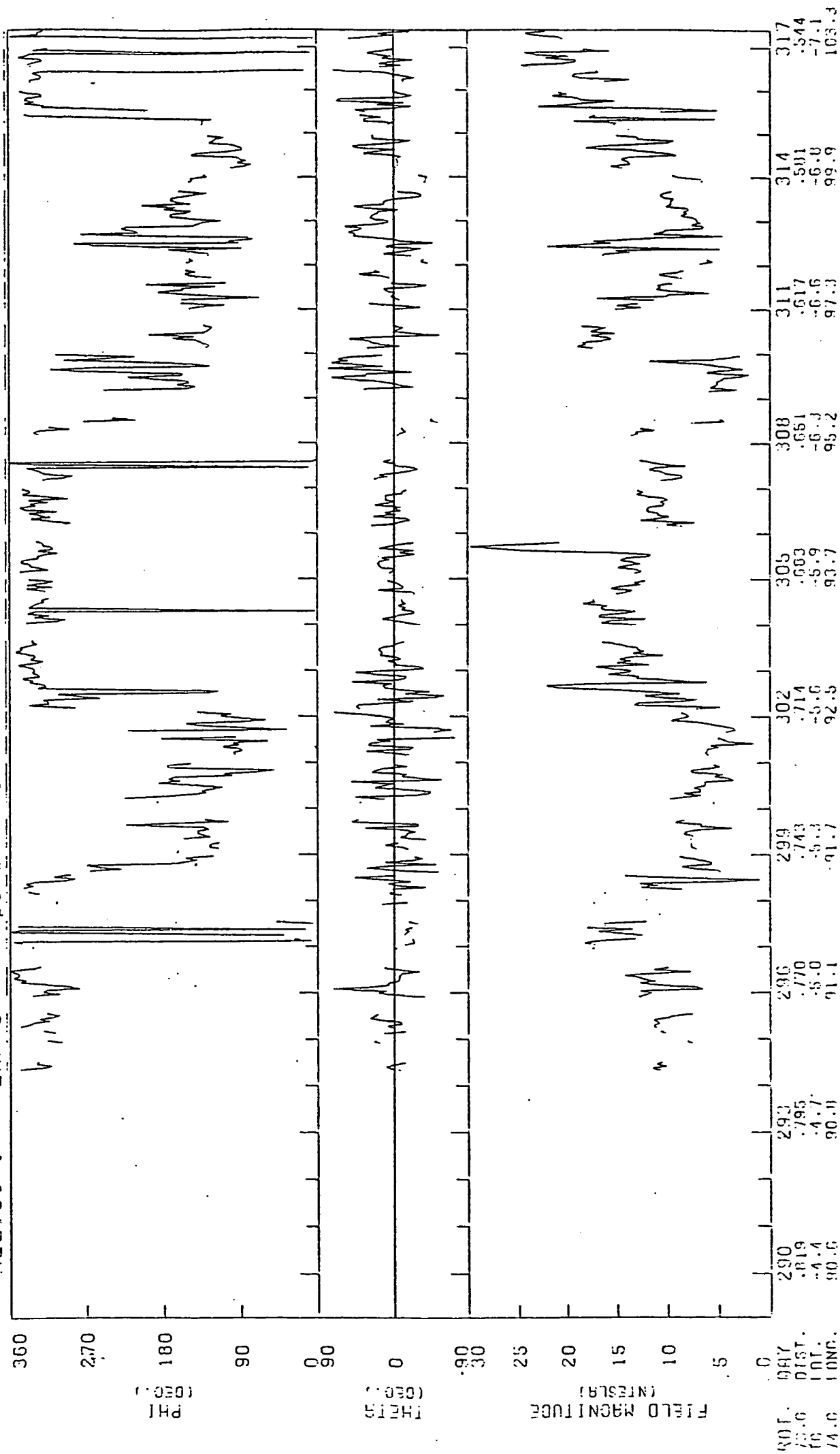


YEAR 1980

HELIOS 1 EXP 3 (HOURLY AVERAGES)

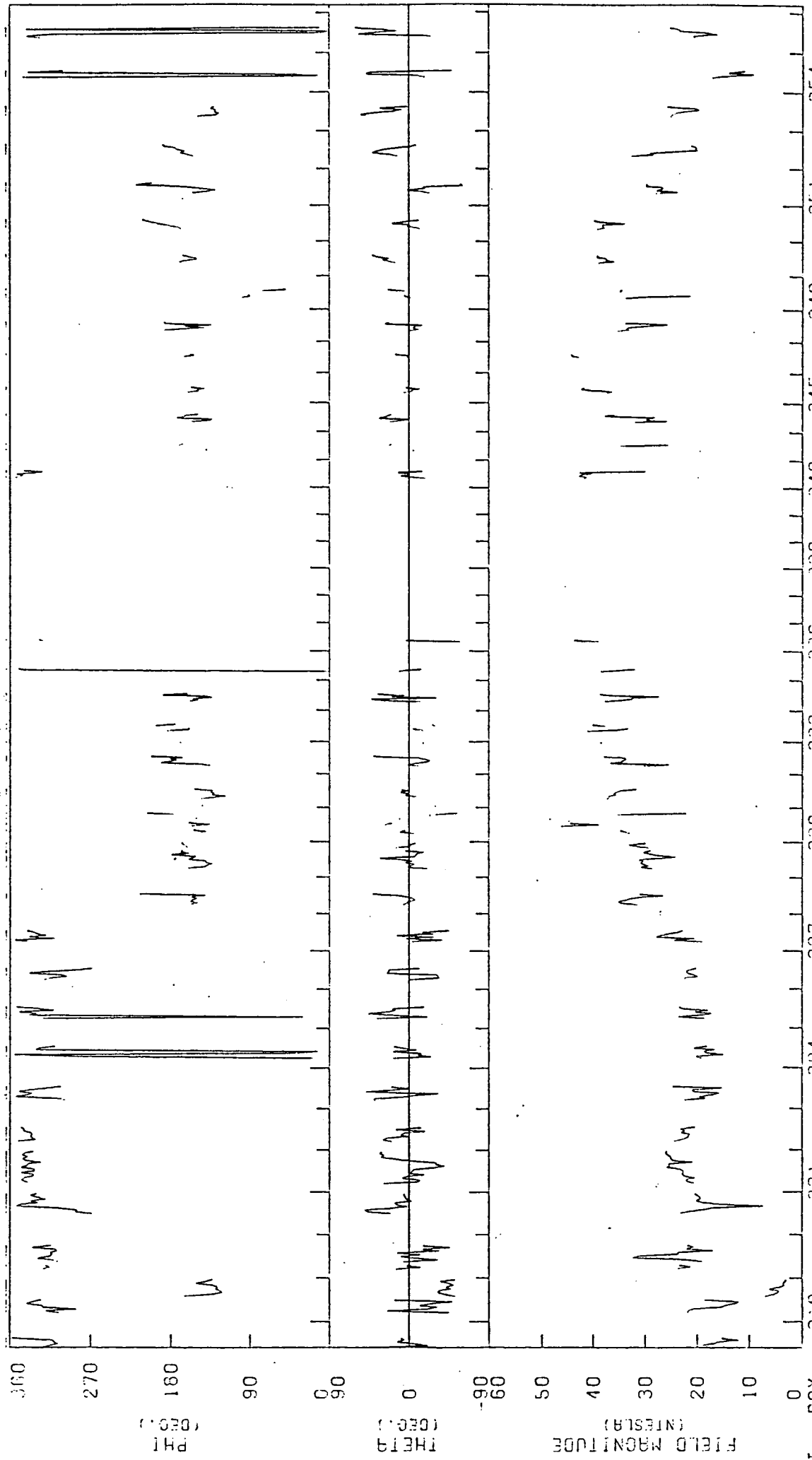


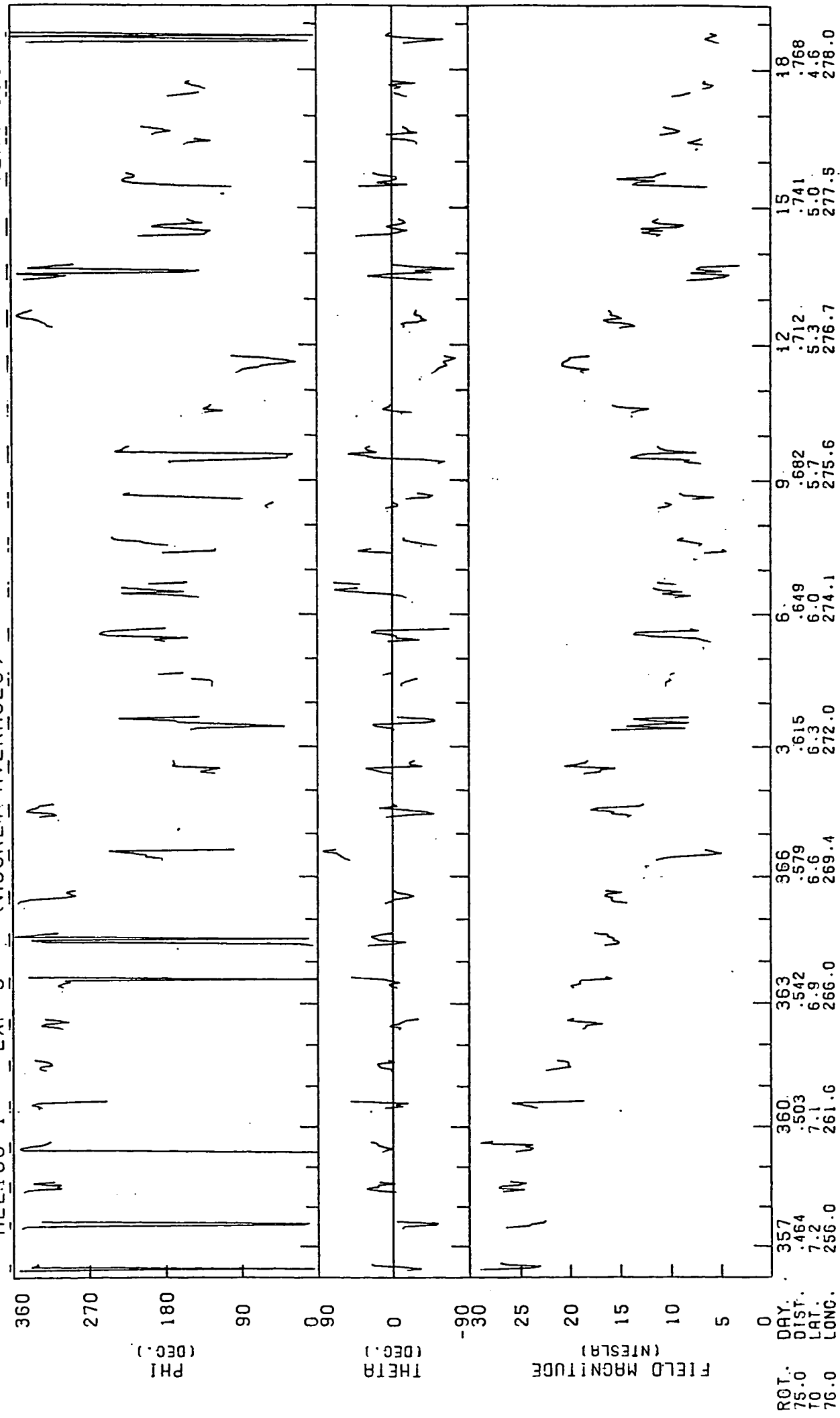
ROT.	DAY	70.0	101.0	151.0	201.0	251.0	301.0	351.0
	209	.890	2.1					
	212	.897	2.3					
	215	.912	2.5					
	218	.926	2.7					
	221	.939	2.9					
	224	.950	3.1					
	227	.959	3.3					
	230	.967	3.5					
	233	.973	3.8					

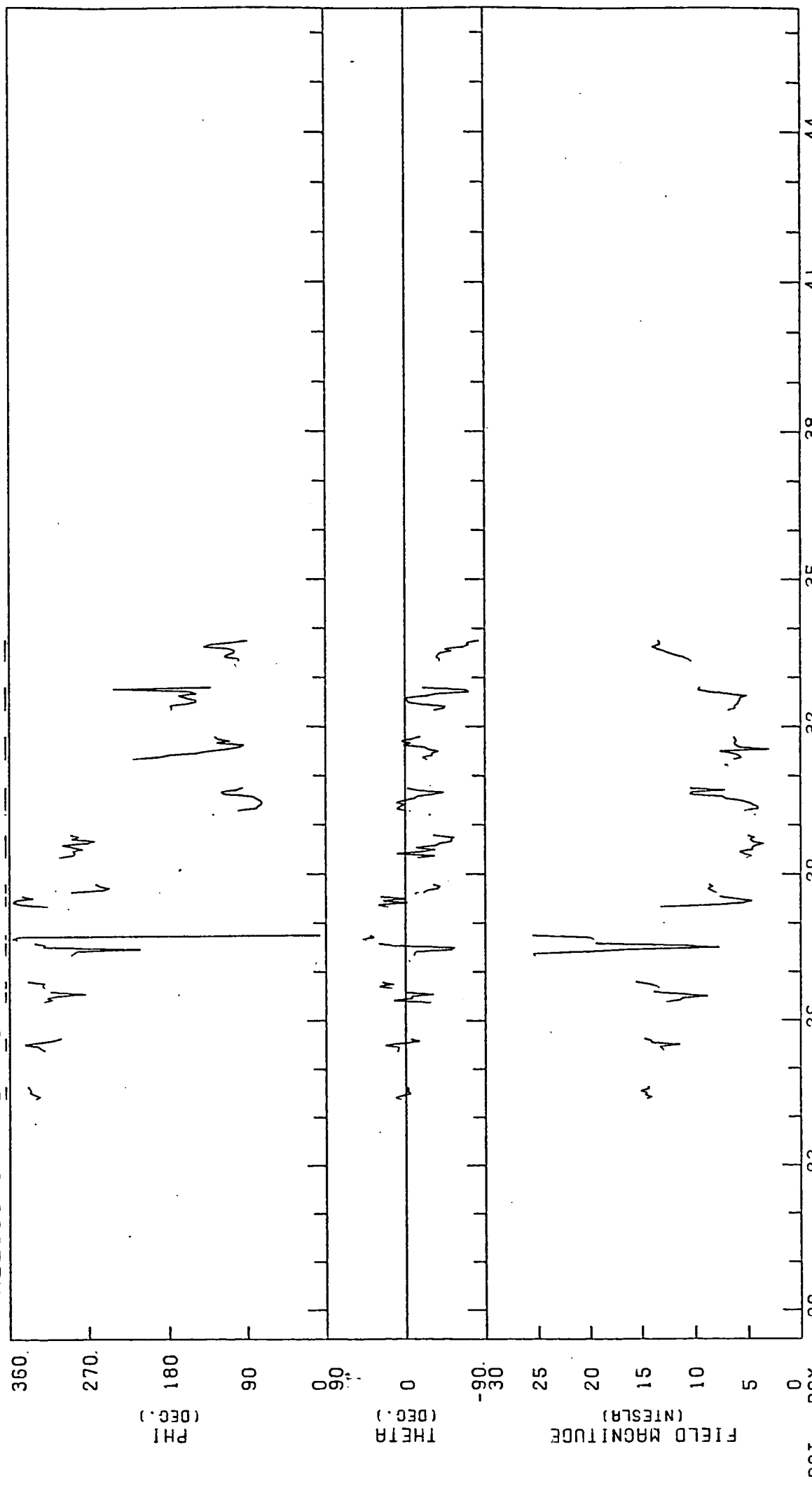


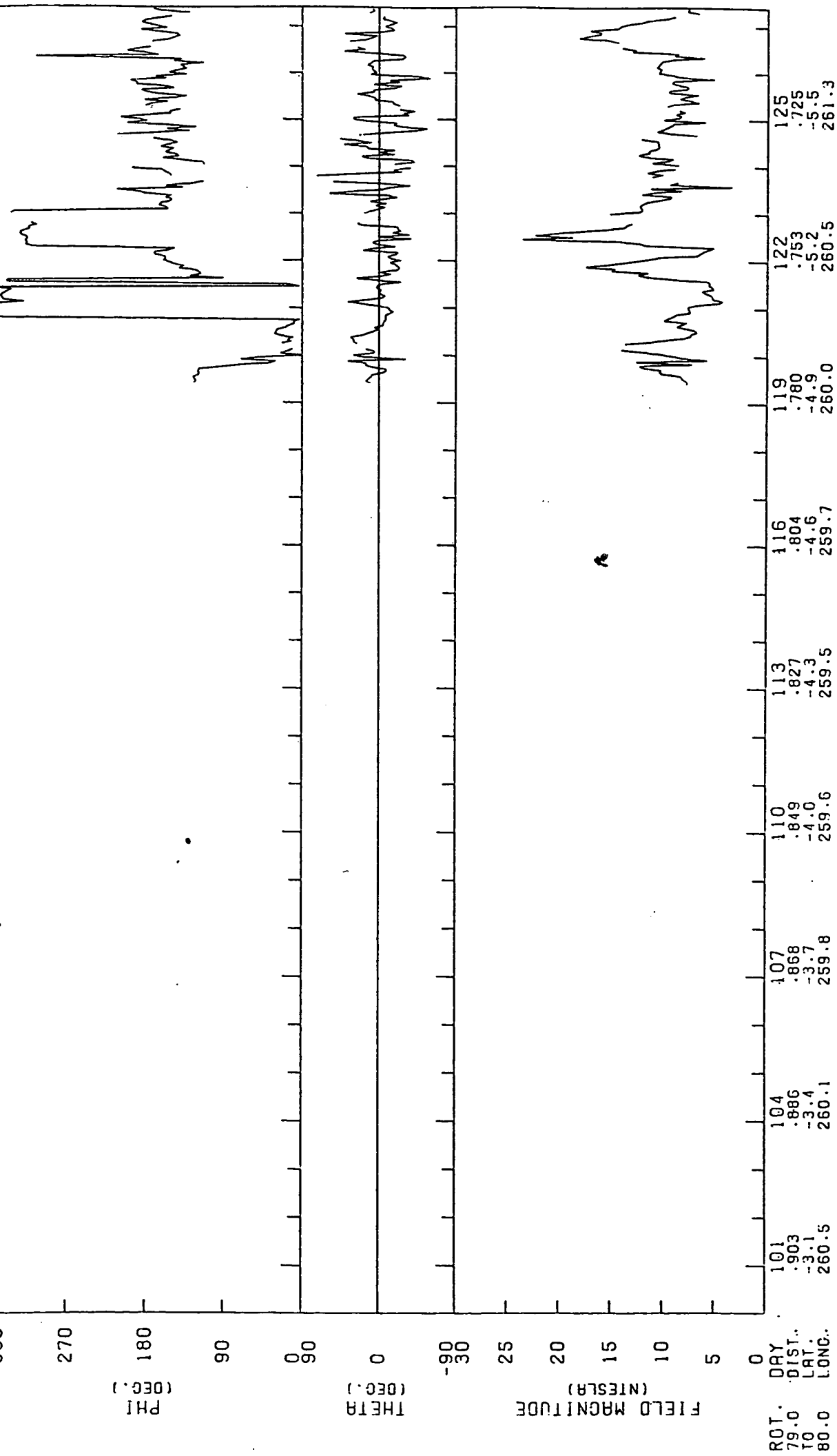
HELIOS 1 EXP 3 (HOURLY AVERAGES)

YEAR 1980



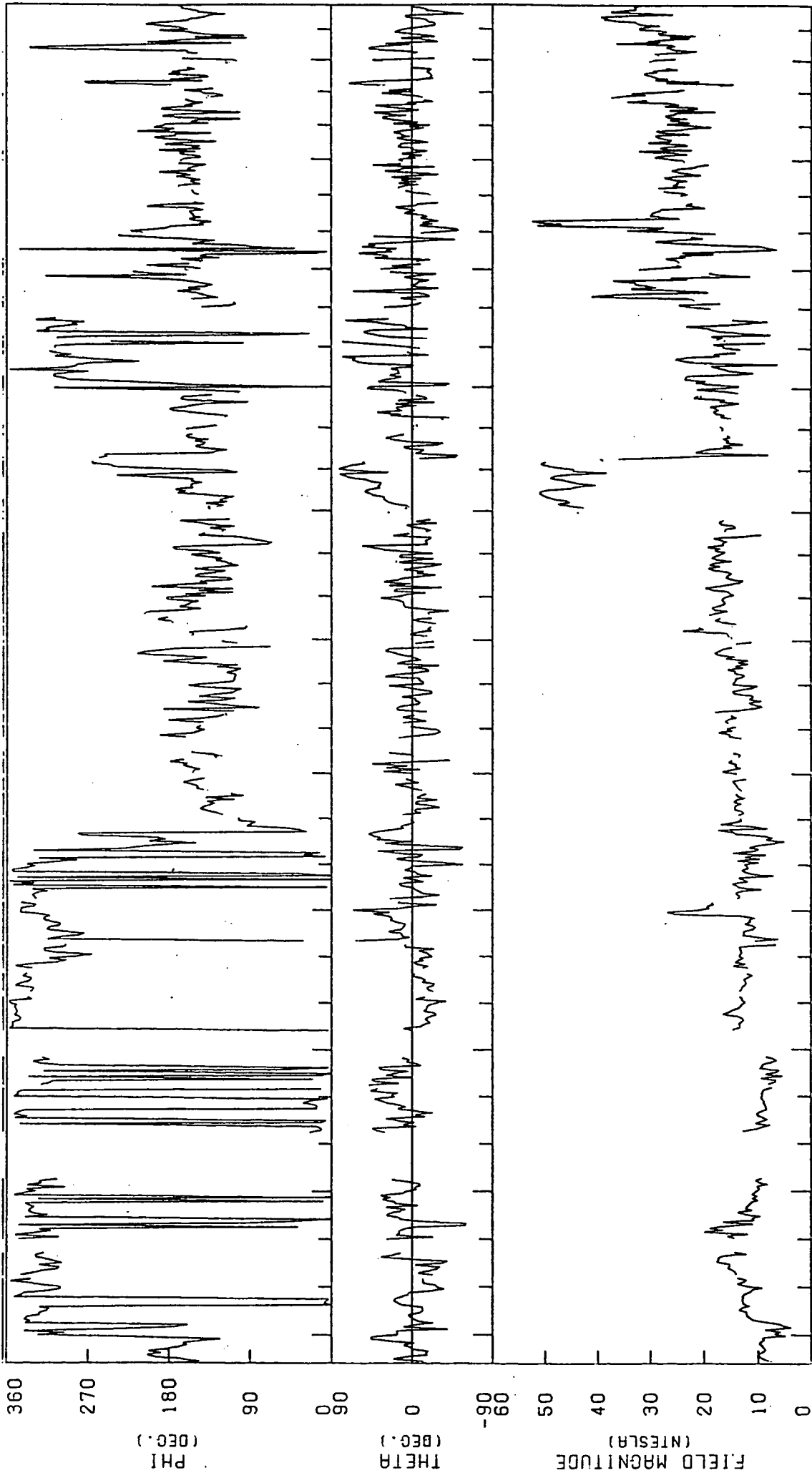


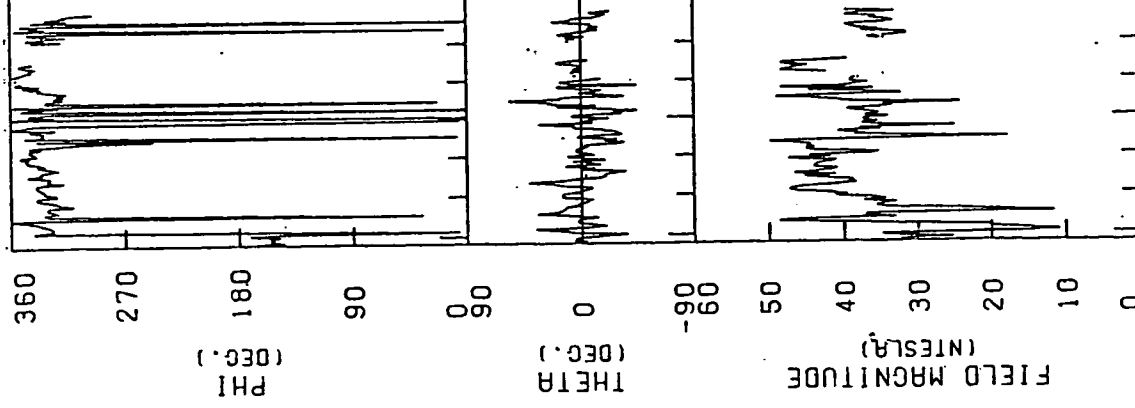




HELIOS 1 EXP 3 (HOURLY AVERAGES)

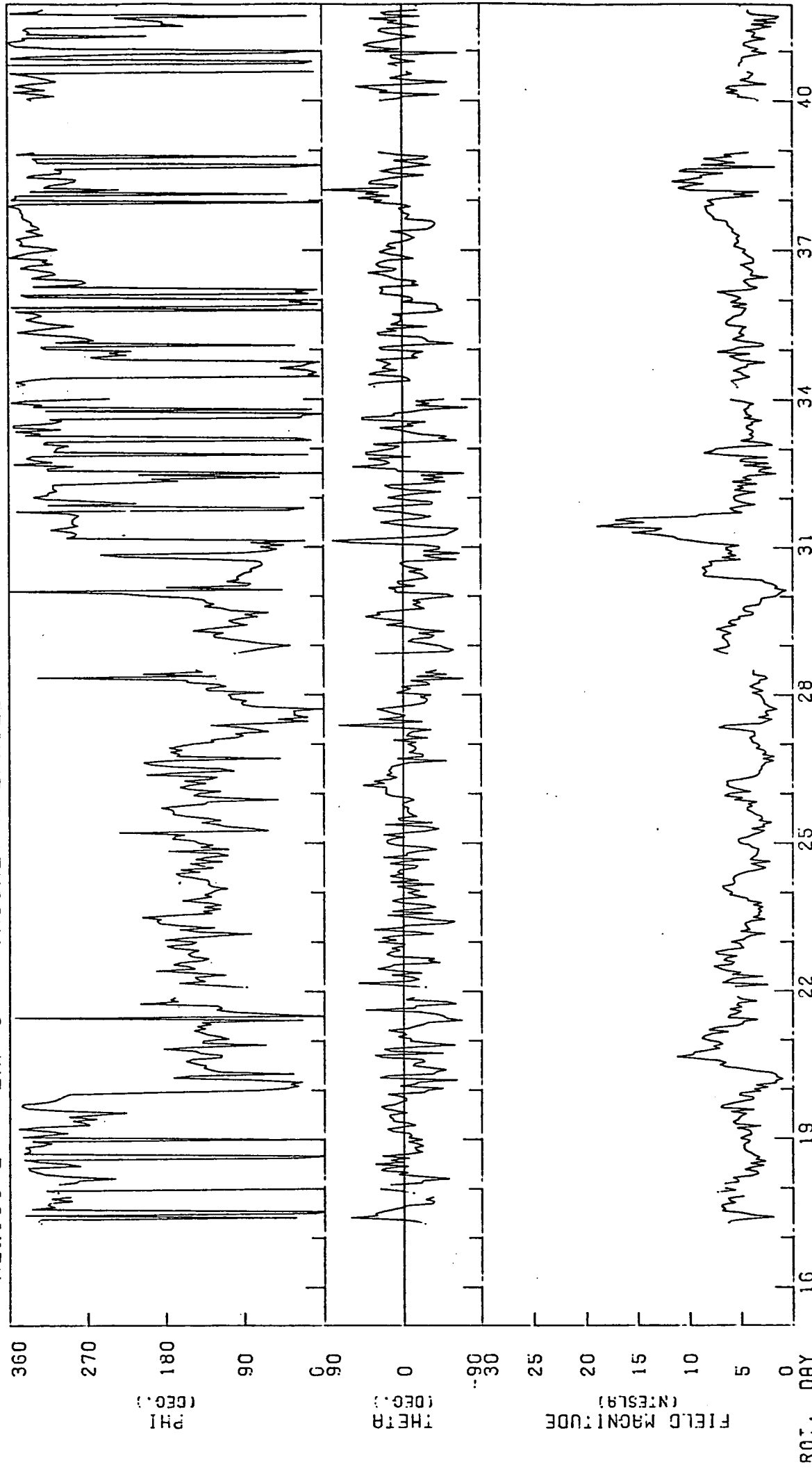
YEAR 1981





ROT. DAY 160 163
81.0 DIST. 323 .311
TO LAT. -3.3 -.8
82.0 LONG. 331.0 348.5

HELIOS 2 EXP 3 (HOURLY AVERAGES) YEAR 1976

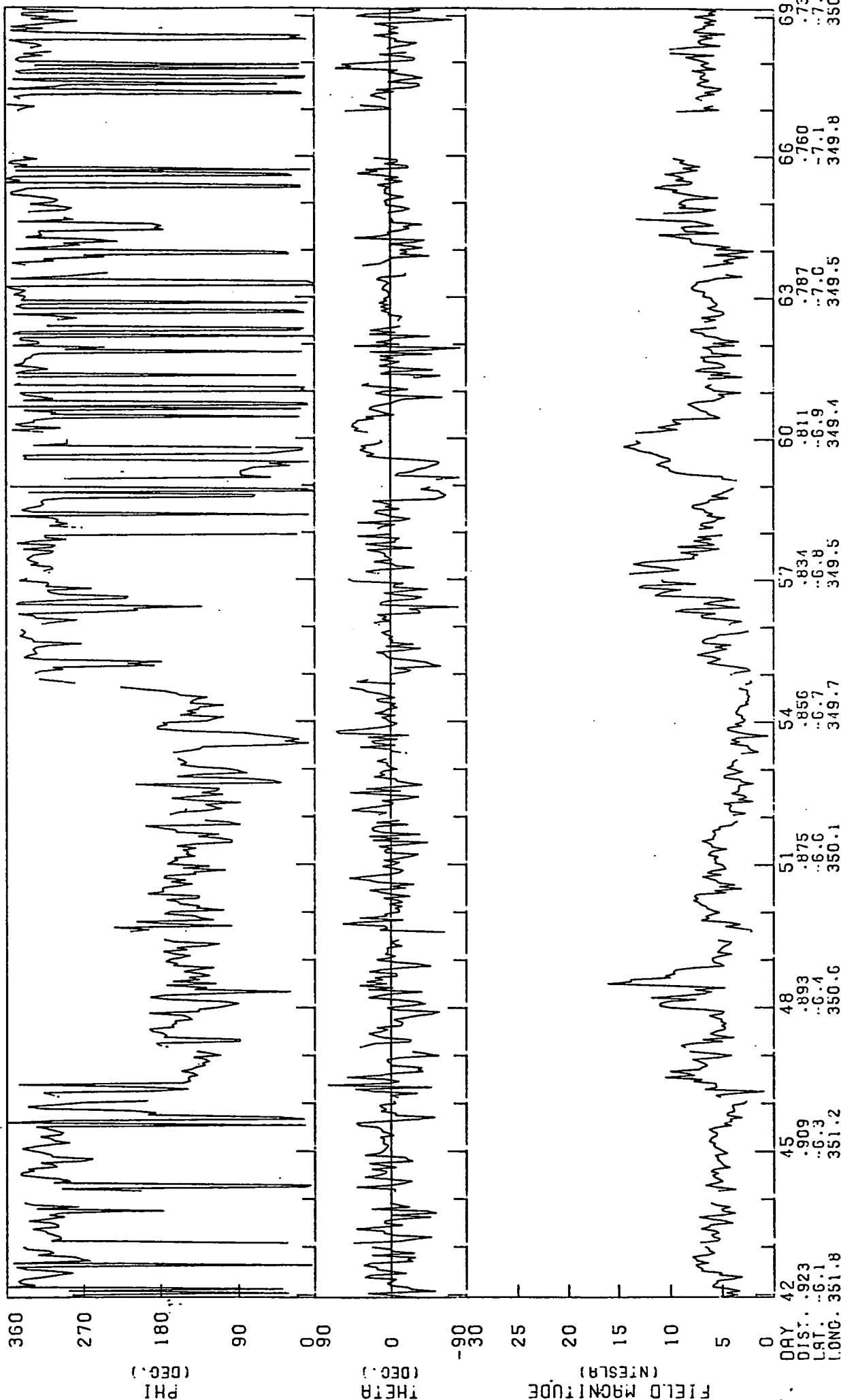


YEAR 1976

(HOURLY AVERAGES)

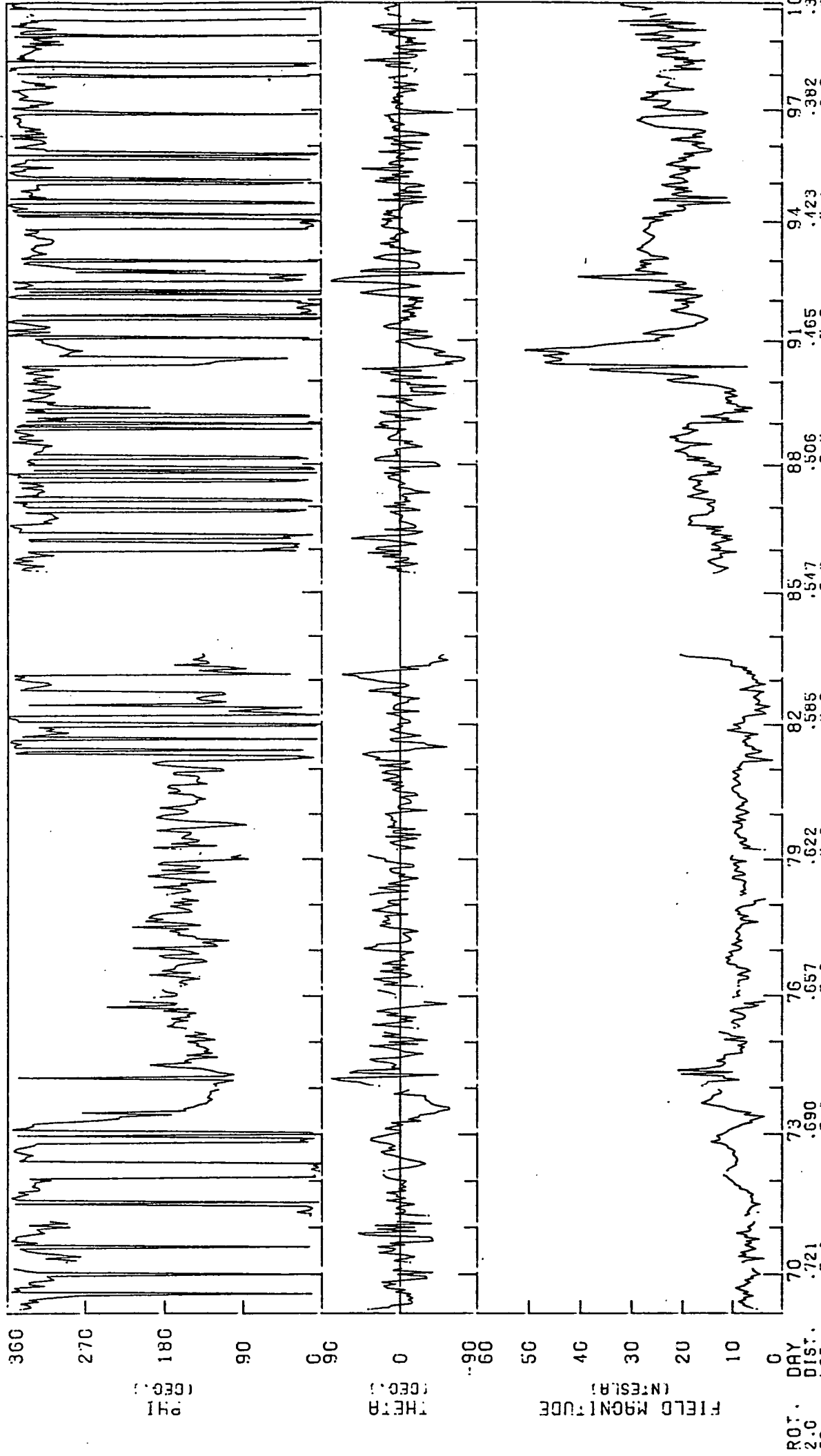
EXP 3

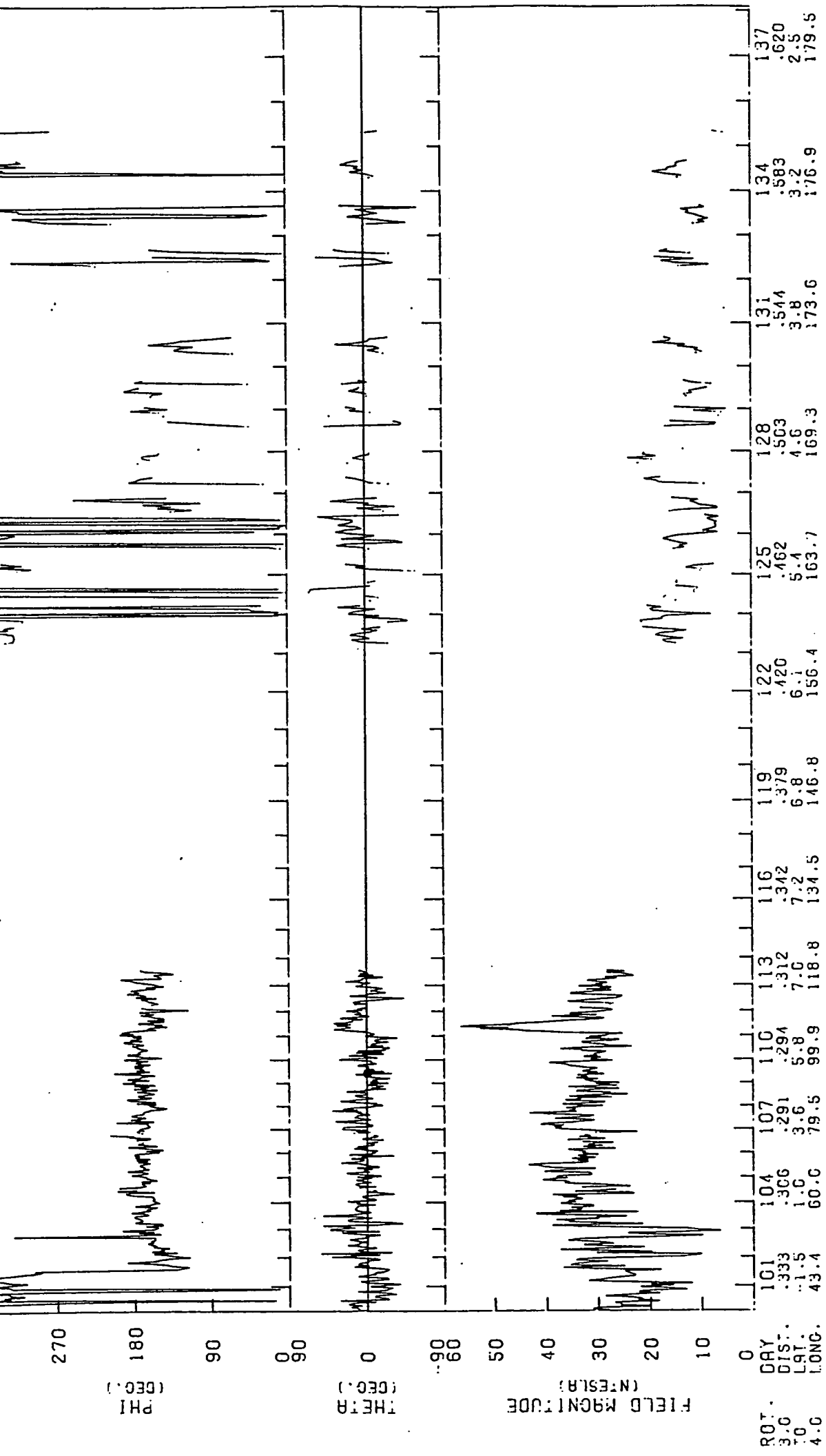
HELIOS 2

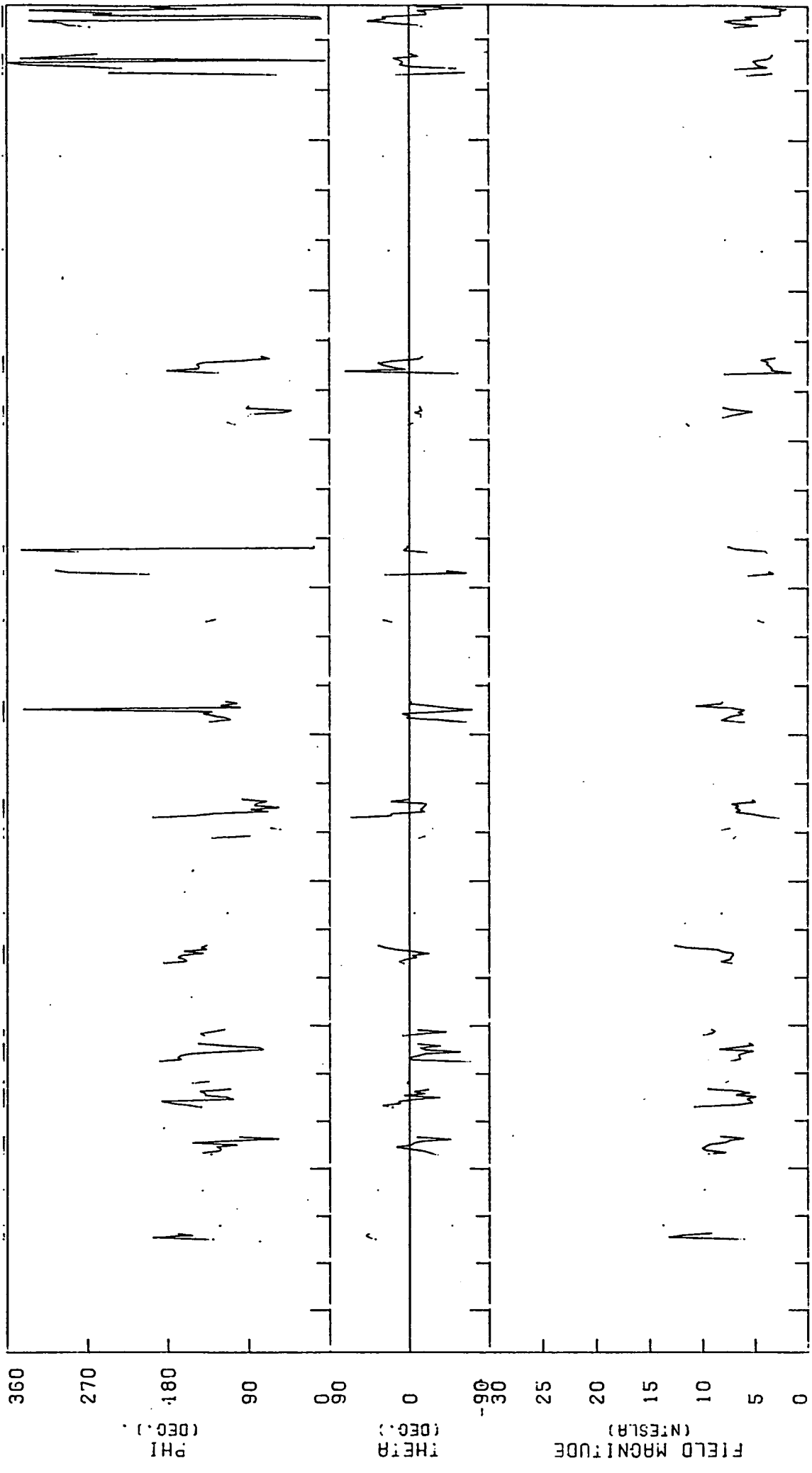


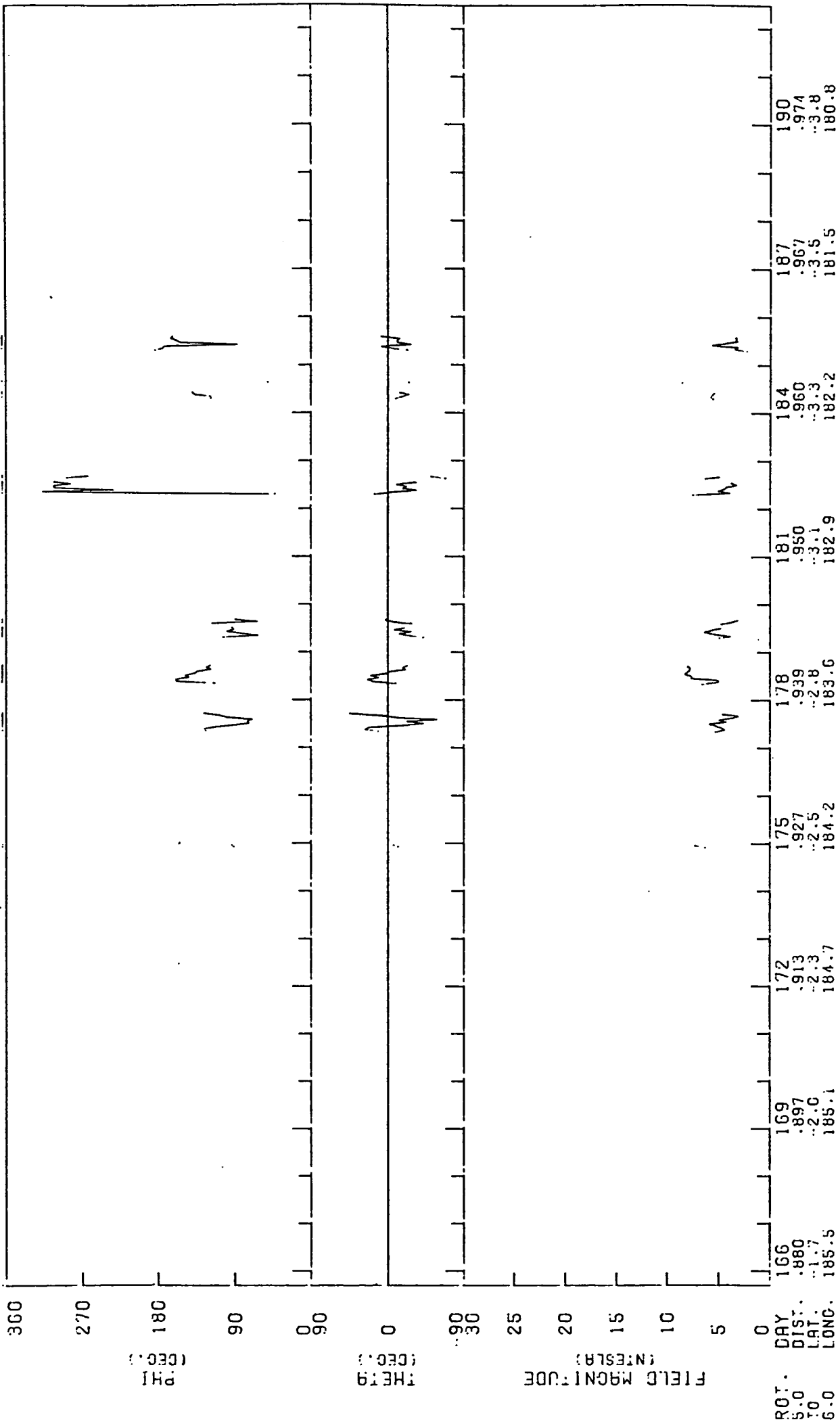
HELIOS 2 EXP 3 (HOURLY AVERAGES)

YEAR 1976

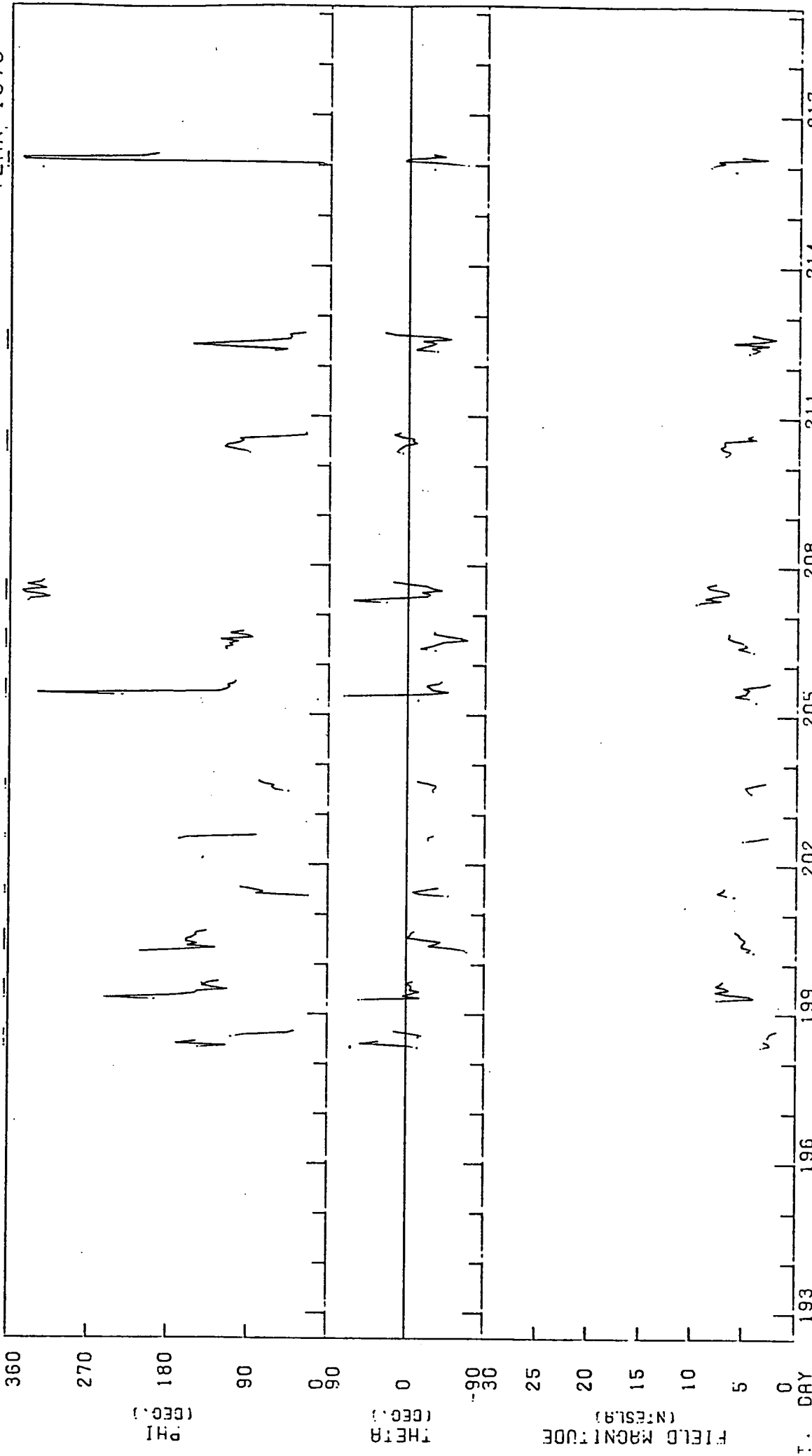




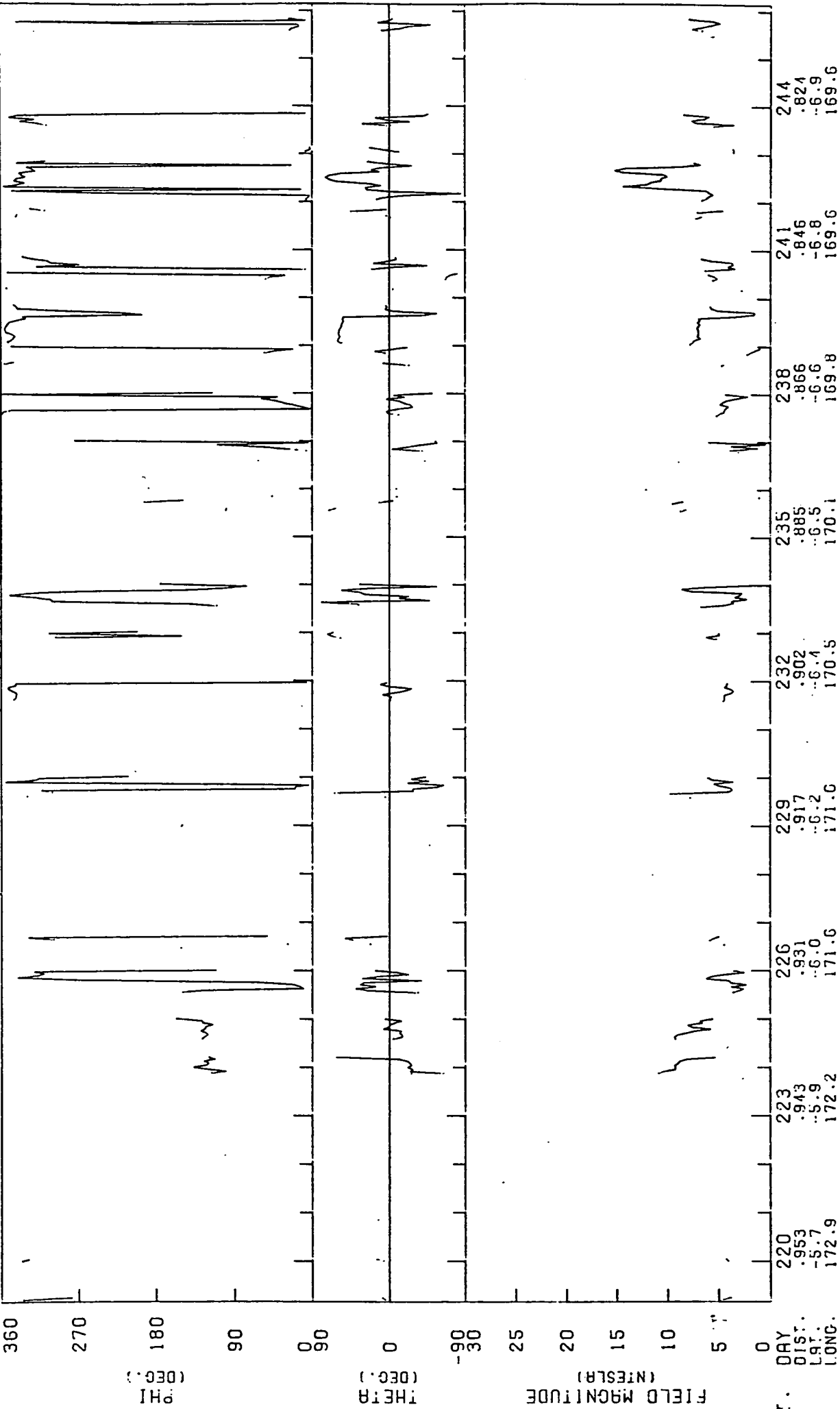




HELIOS 2 EXP 3 (HOURLY AVERAGES) YEAR 1976



ROT. DAY 193 196 199 202 205 208 211 214 217
6.0 .978 .981 .983 .982 .979 .975 .969 .962

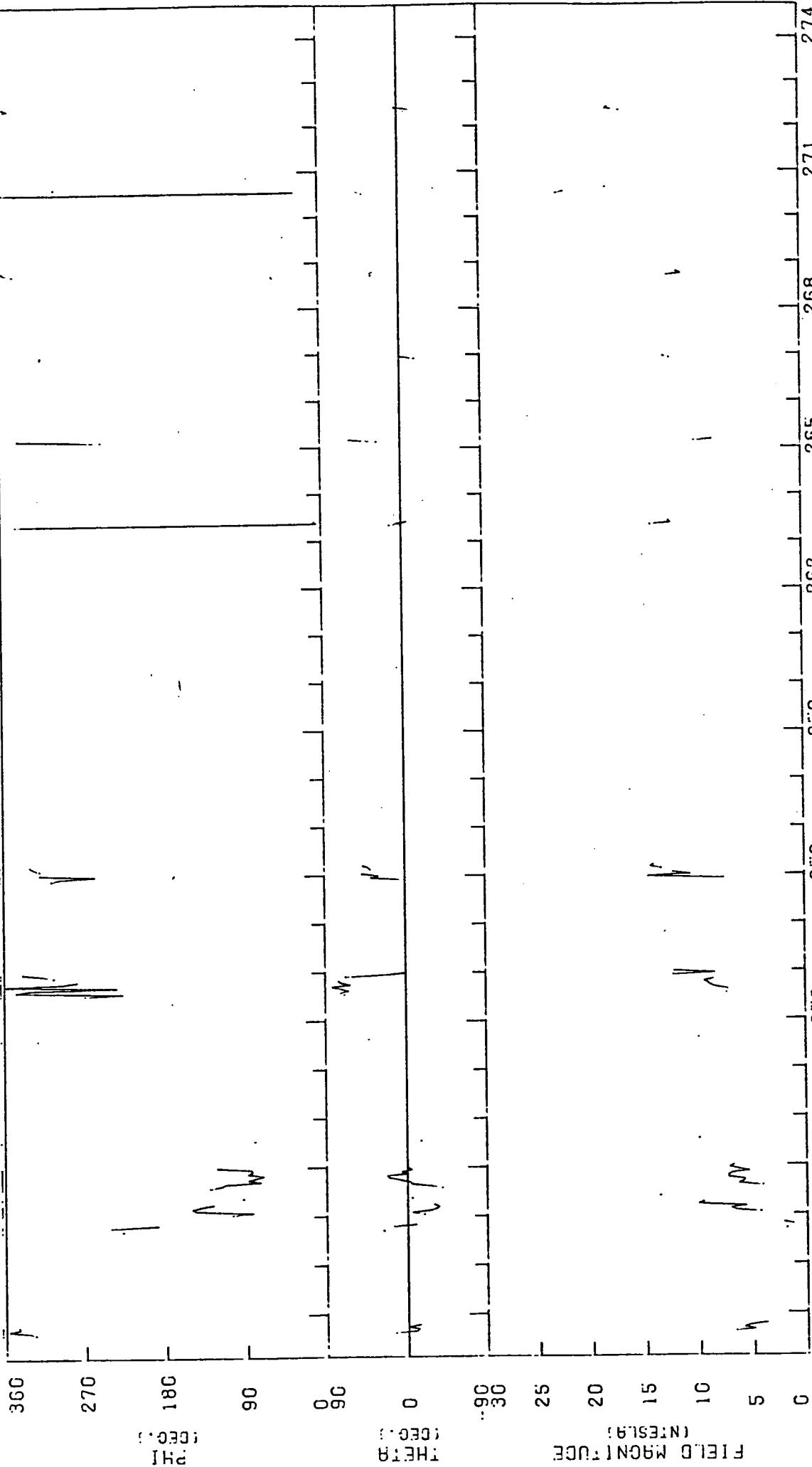


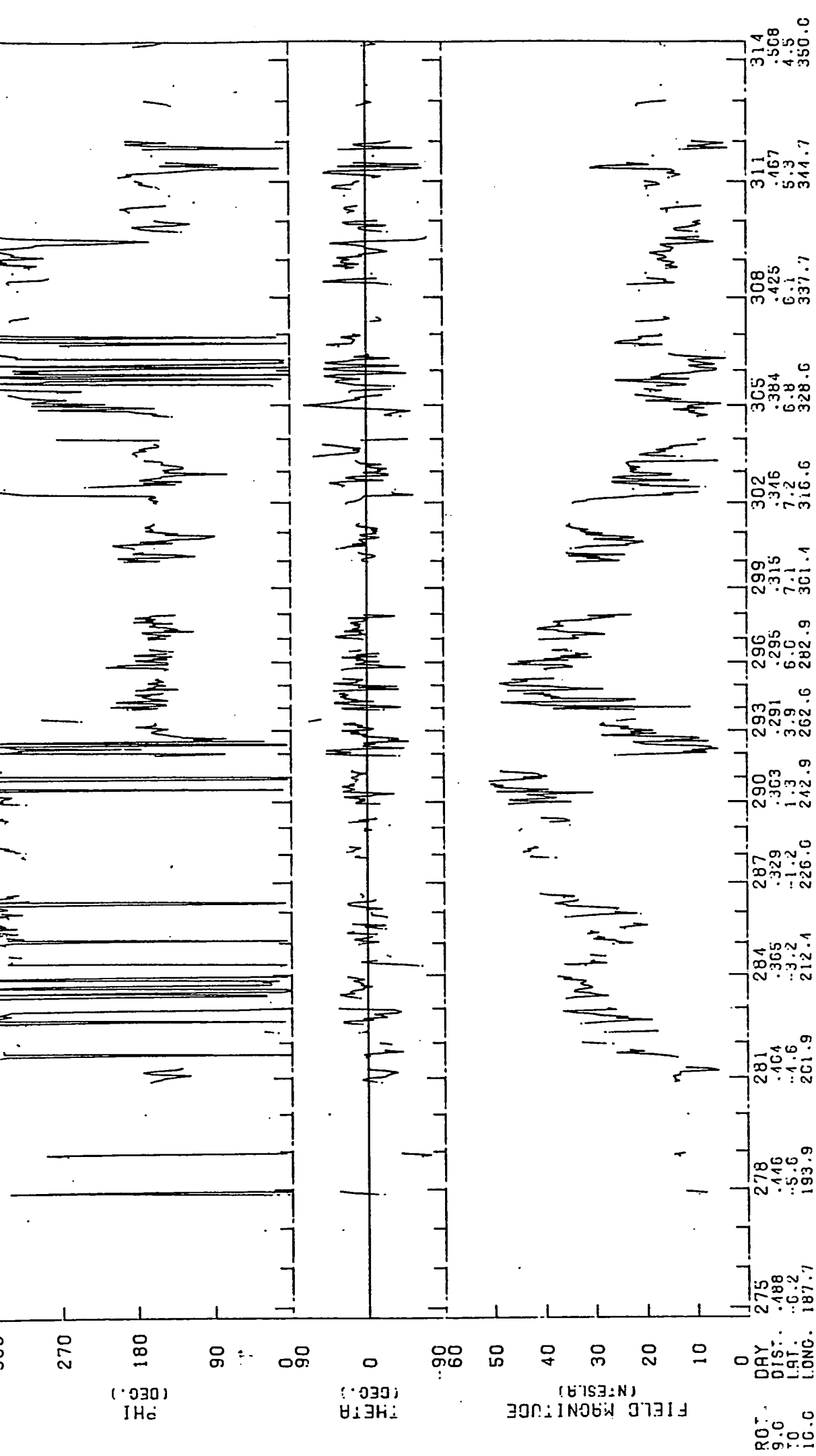
YEAR 1976

HELIOS 2 EXP 3 (HOURLY AVERAGES)

EXP 3

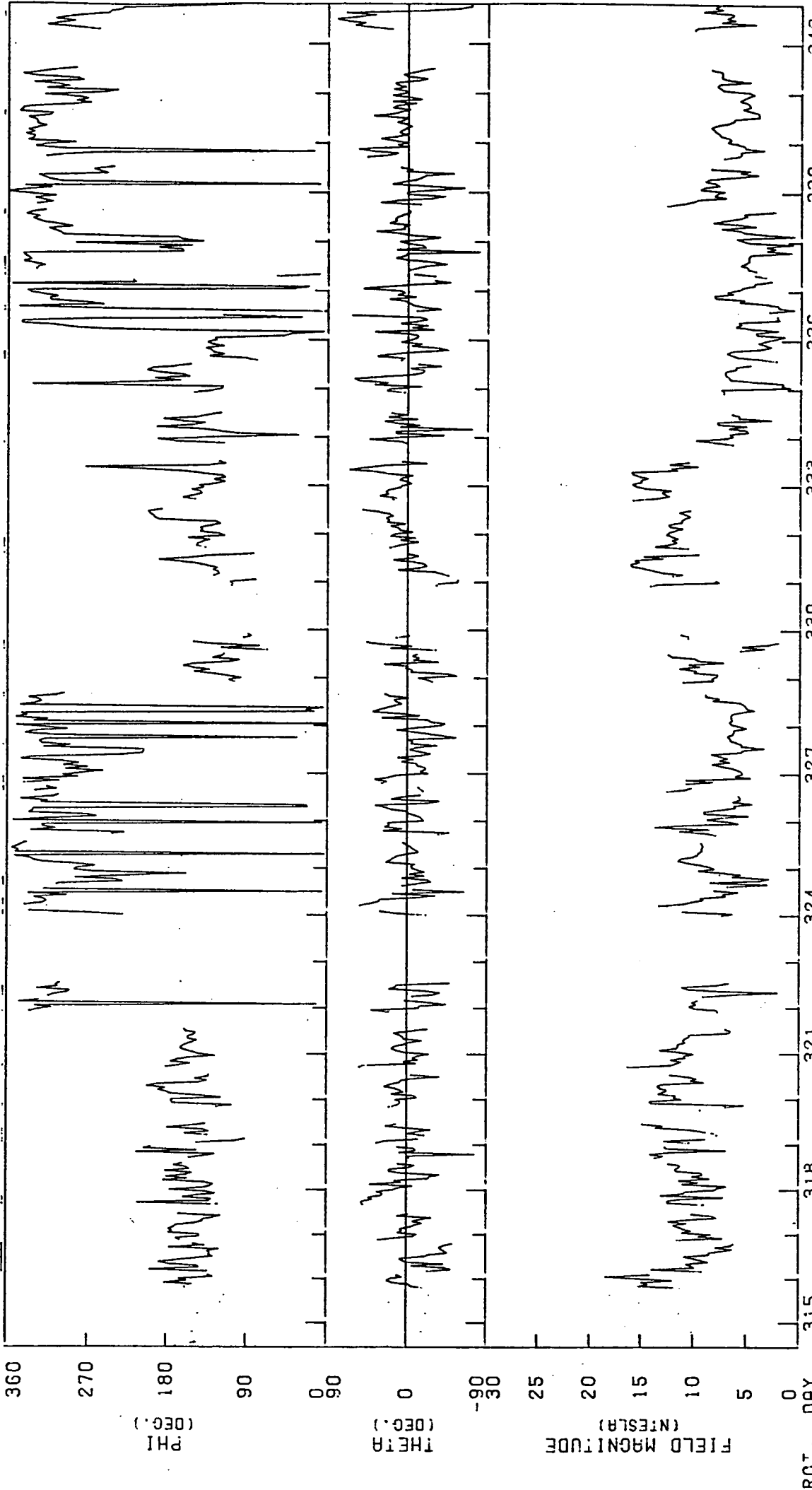
HELIOS 2

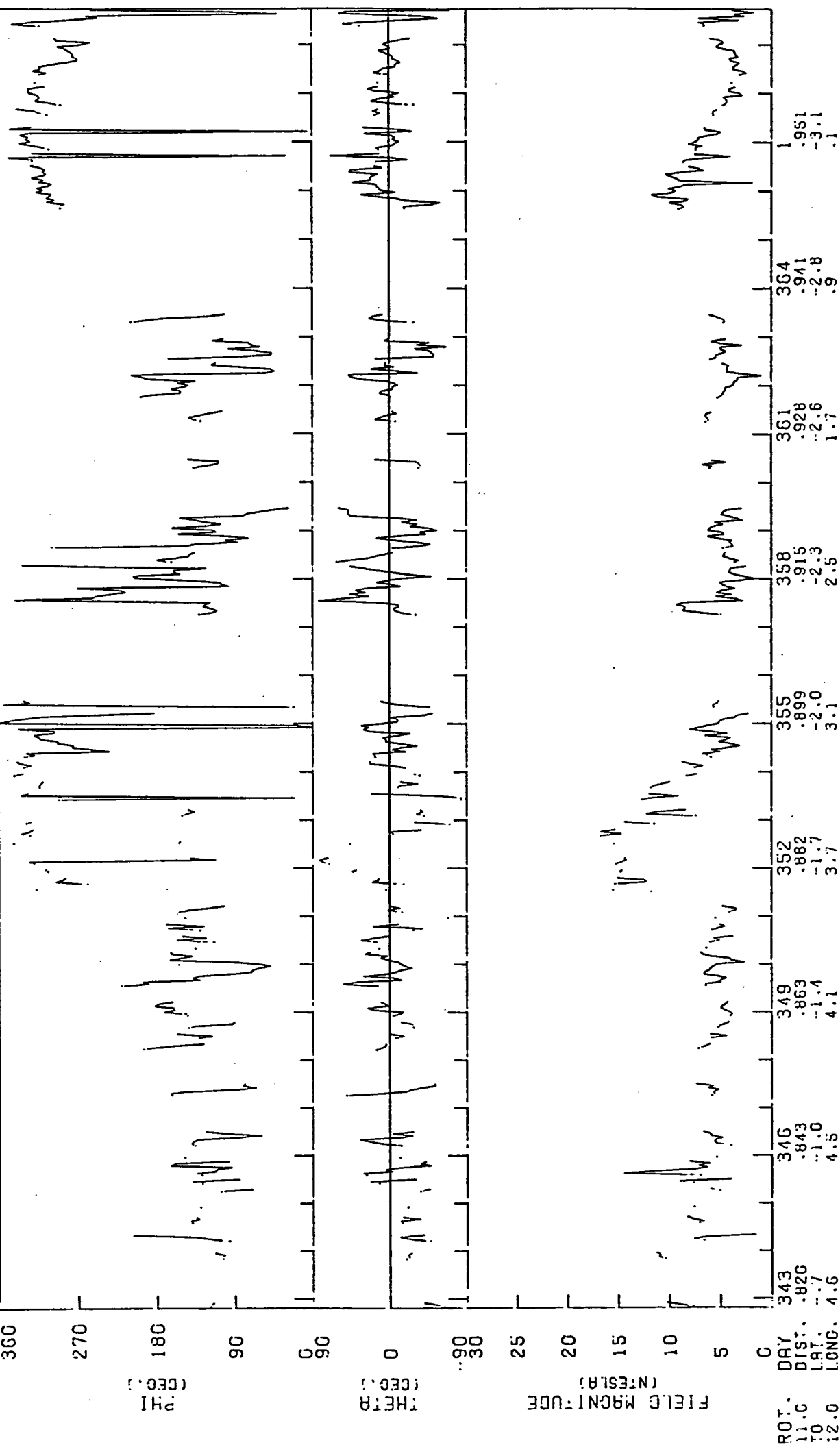




HELIOS 2 EXP 3 (HOURLY AVERAGES)

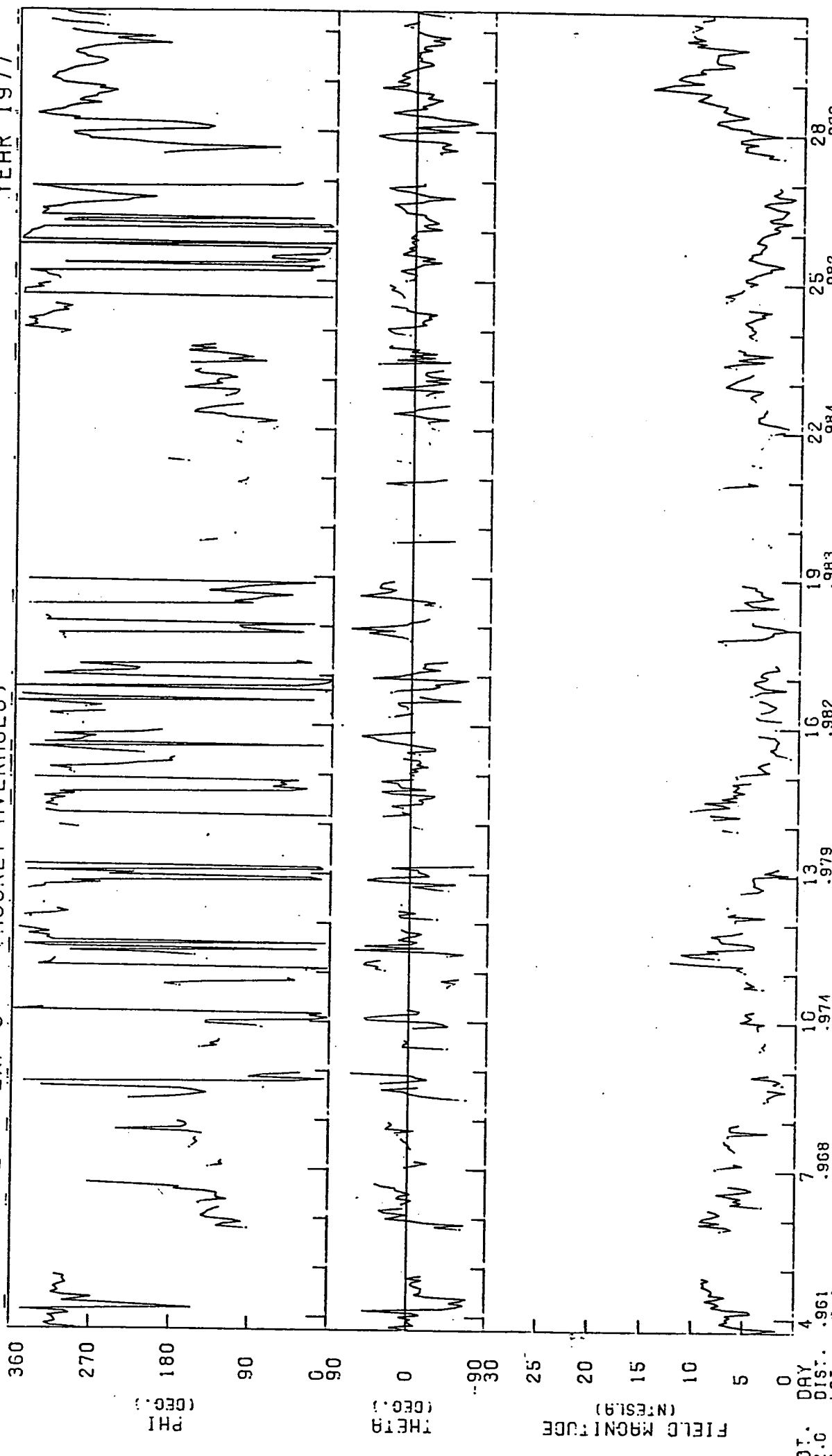
YEAR 1976

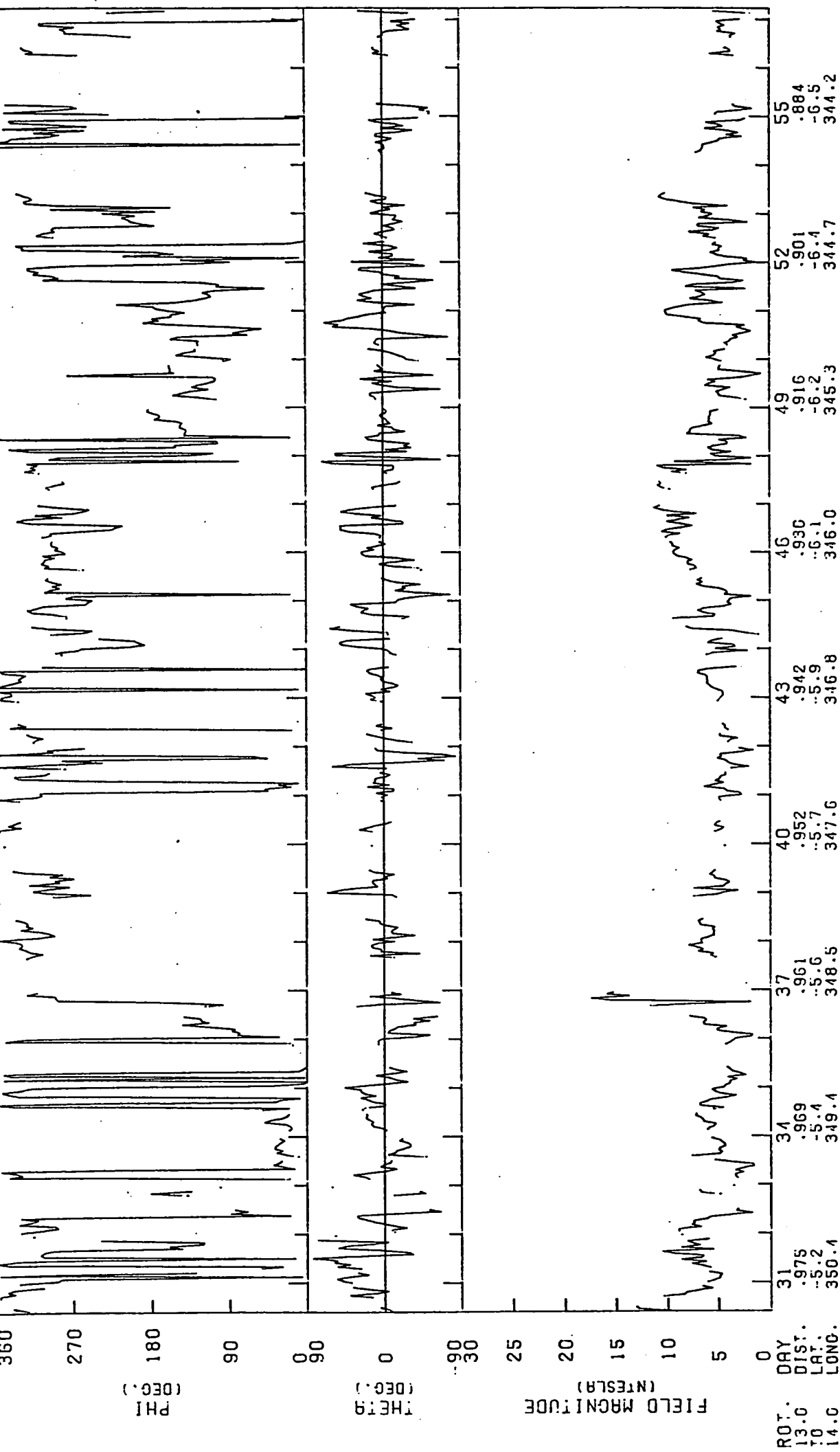




HELIOS 2 EXP 3 (HOURLY AVERAGES)

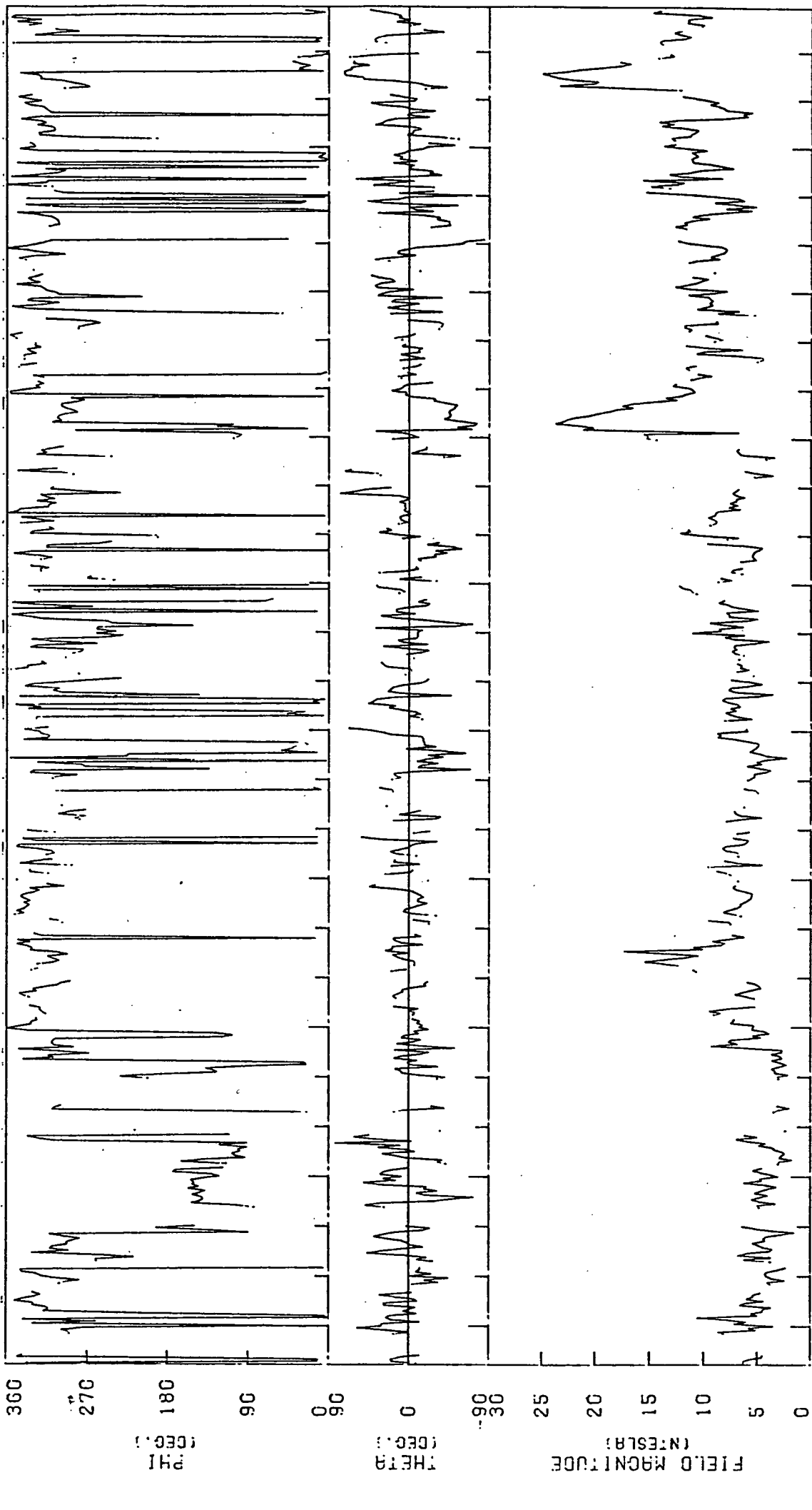
YEAR 1977

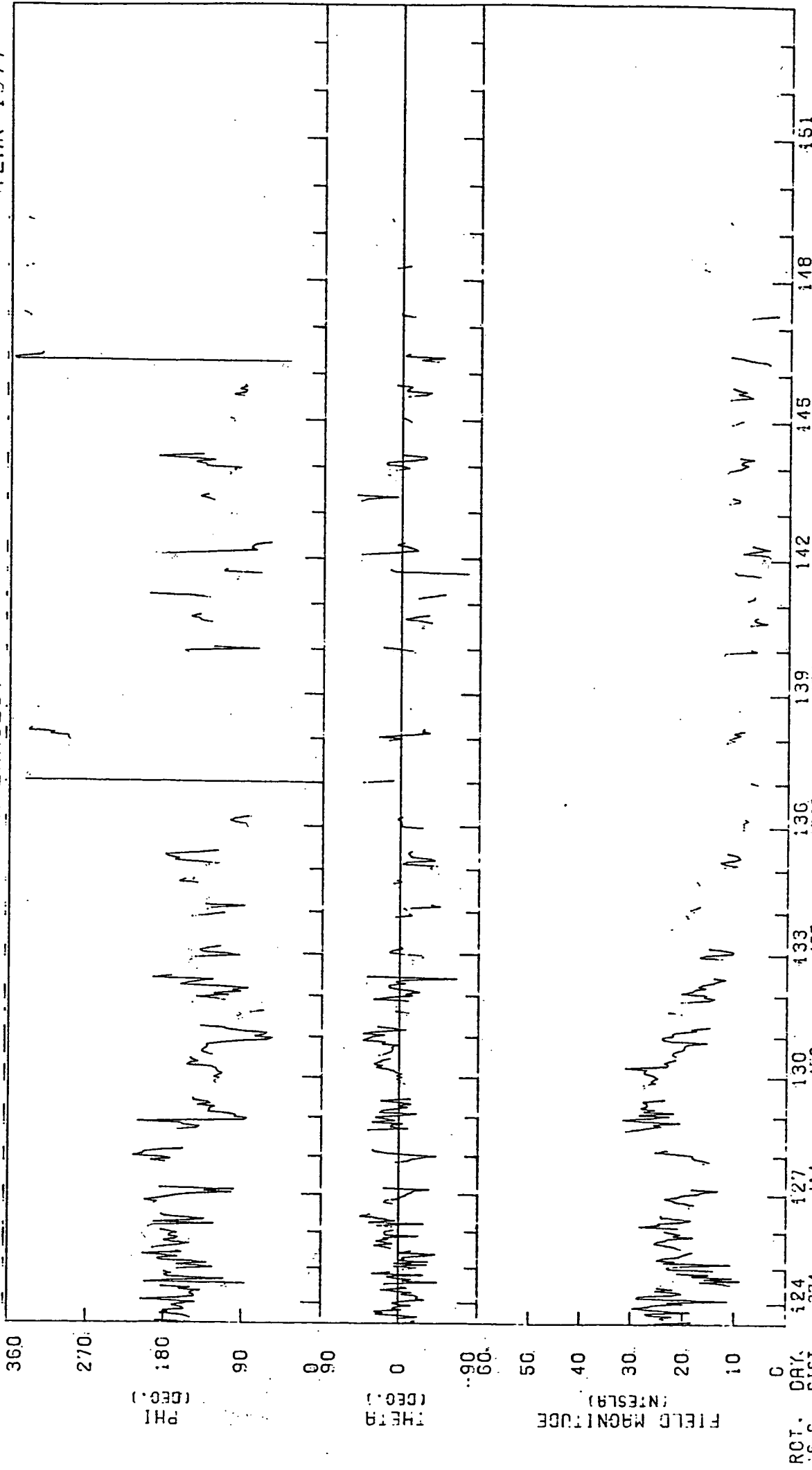


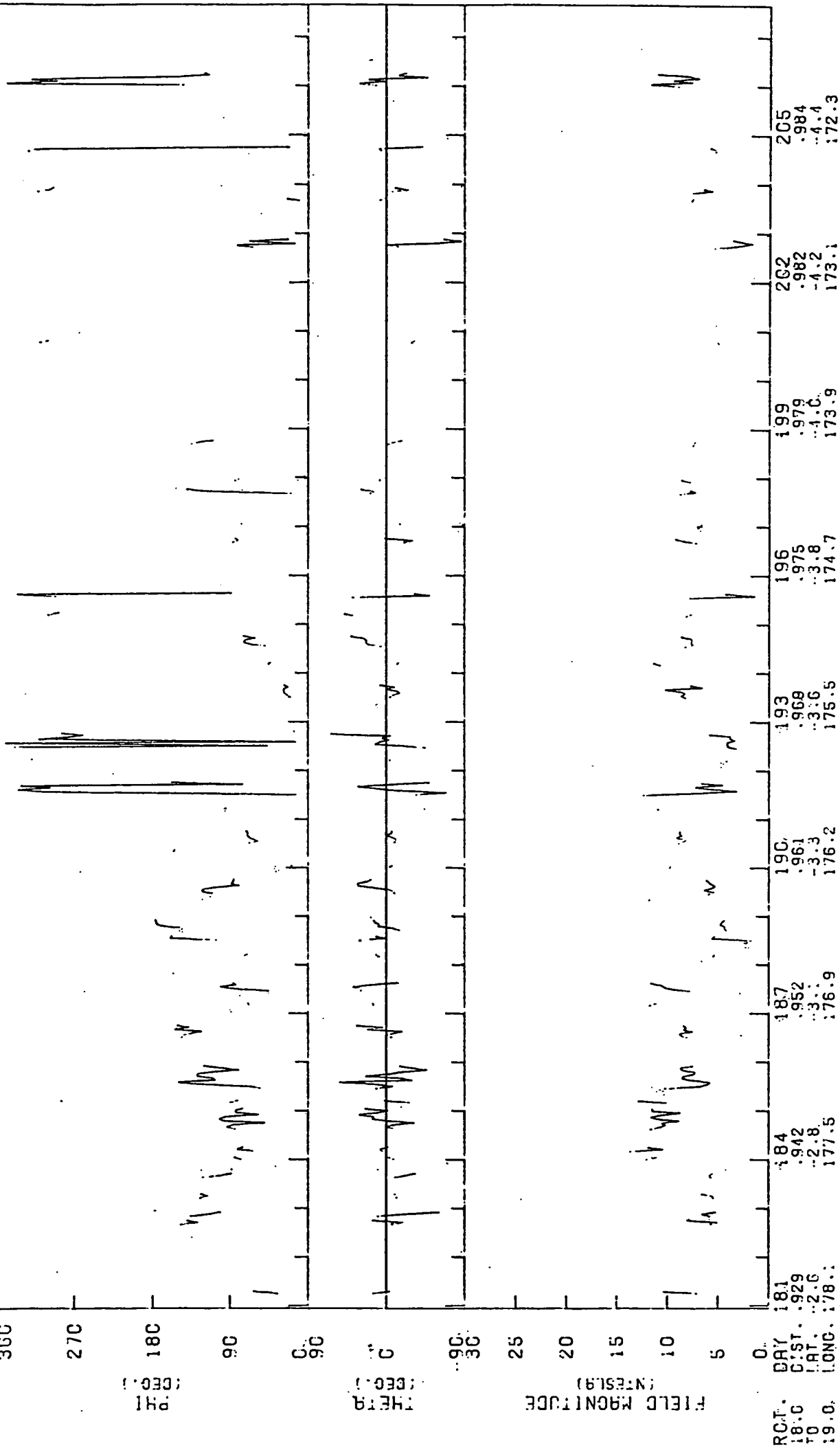


HELIOS 2 EXP 3 (HOURLY AVERAGES)

YEAR 1977

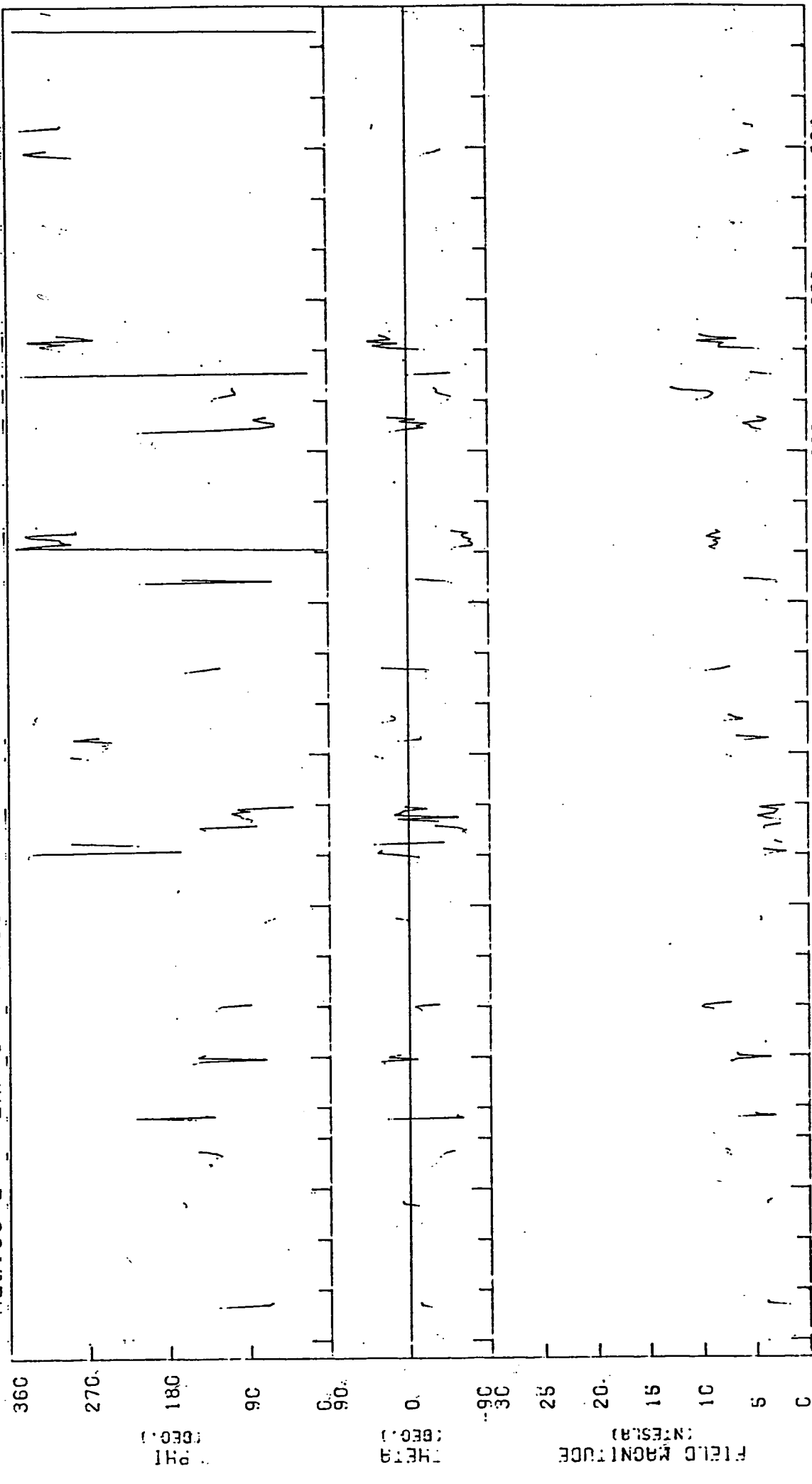


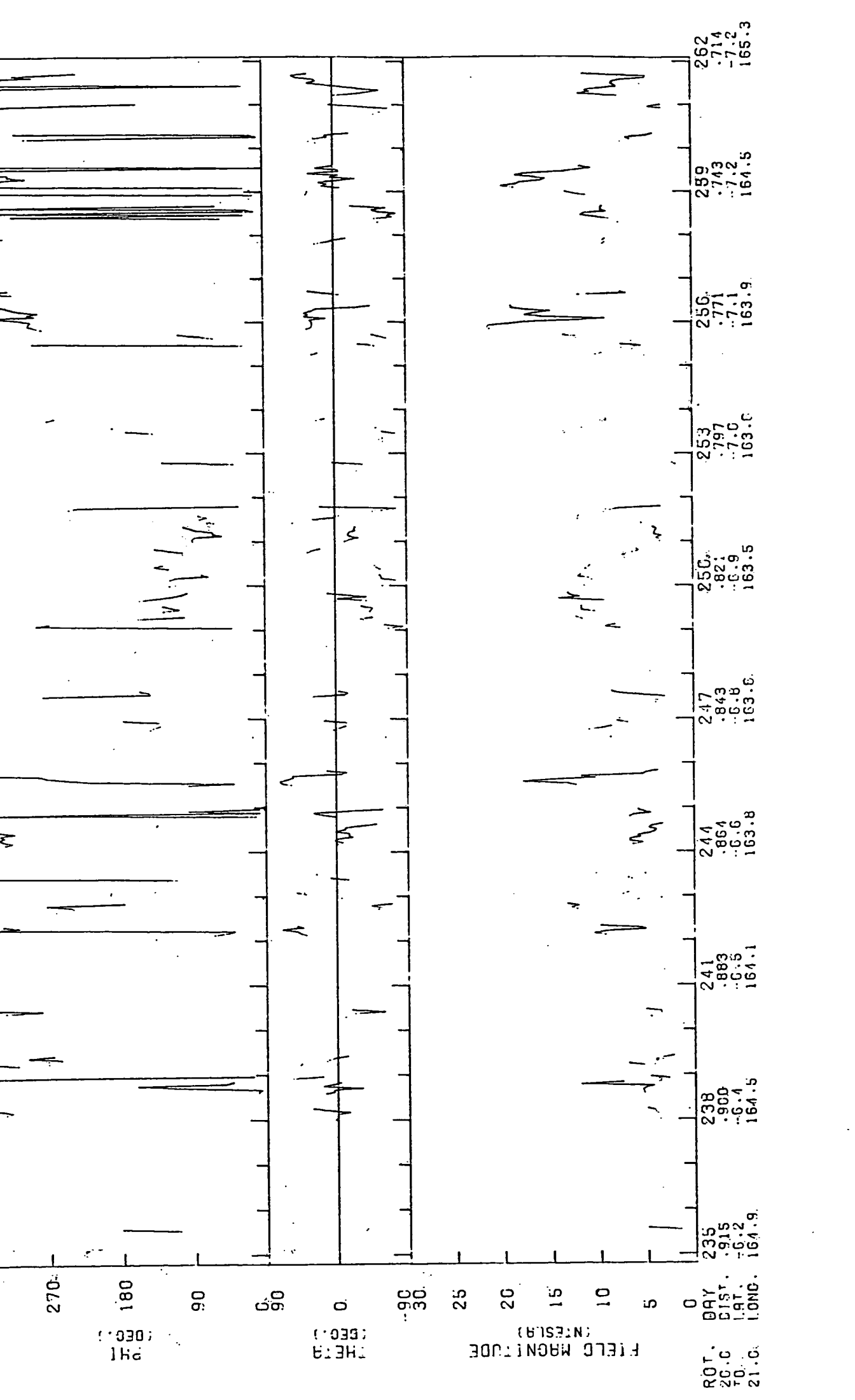




HELIOS 2 EXP 3 (HOURLY AVERAGES)

YEAR 1977

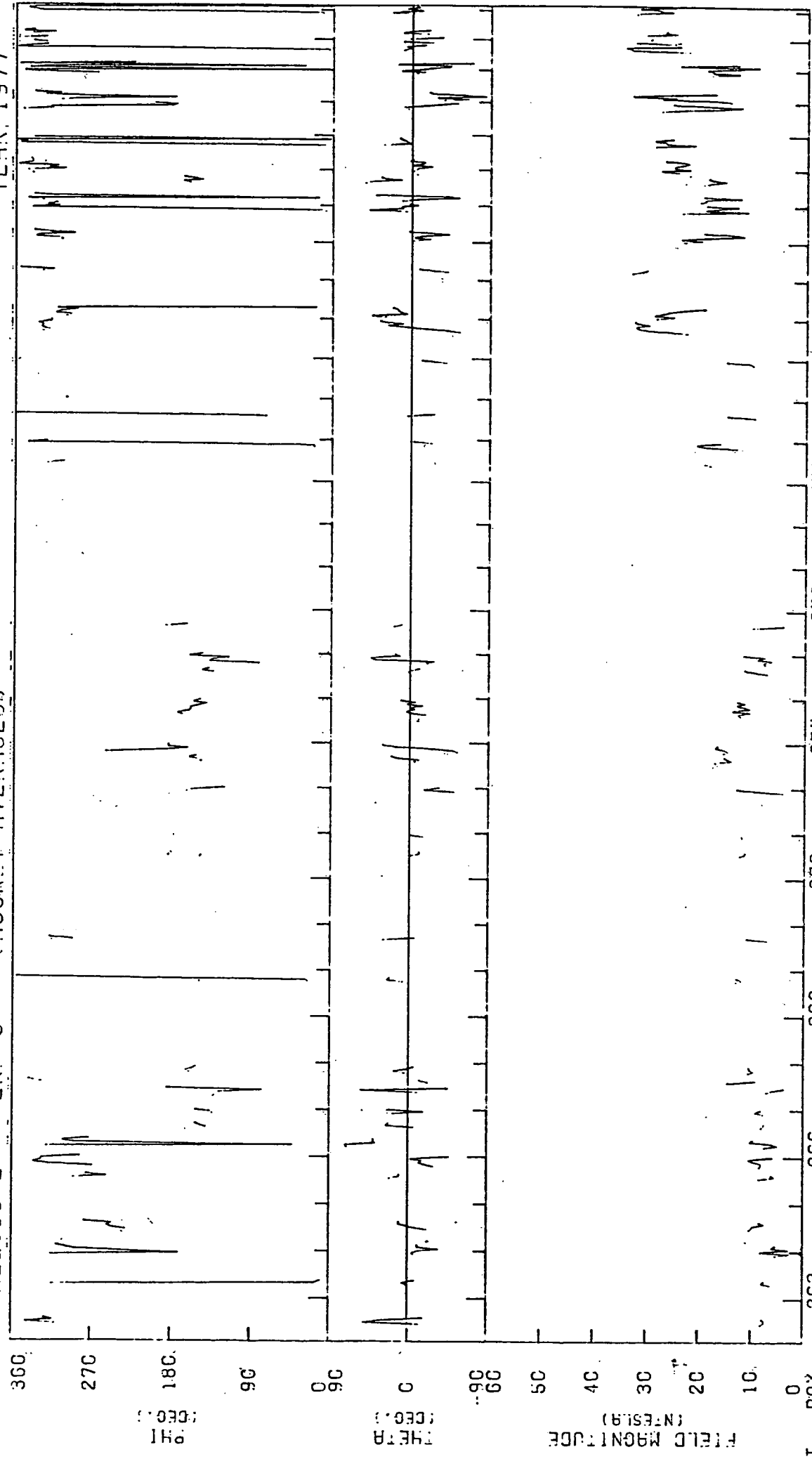




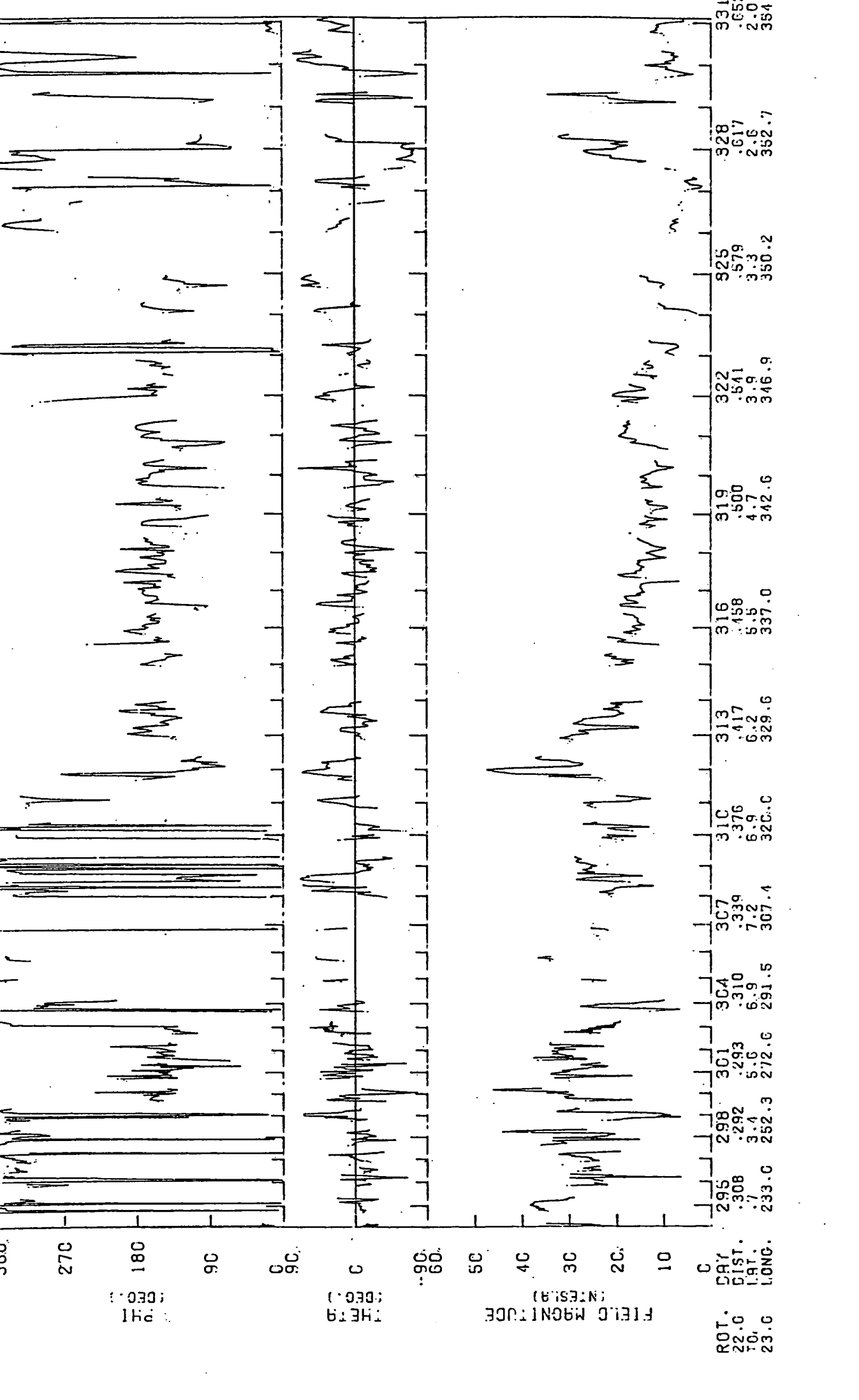
ROT. 20.0 21.0
DAY 235 238 241 244 247 253 256 259 262
DIST. 915 900 .883 .864 .843 .797 .771 .743 .714
LAT. -6.2 -6.4 -6.5 -6.6 -6.8 -7.0 -7.1 -7.2 -7.3
LONG. 164.9 164.5 164.1 163.8 163.6 163.0 163.9 164.5 165.3

HELIOS 2 EXP 3 (HOURLY AVERAGES)

YEAR: 1977



ROT. DAY. DIST. 21.0 263 266 269 272 275 278 281 284 287 290 293



ROT.
22.0
FO.
23.0

CAR.
DIST.
LAT.
LONG.

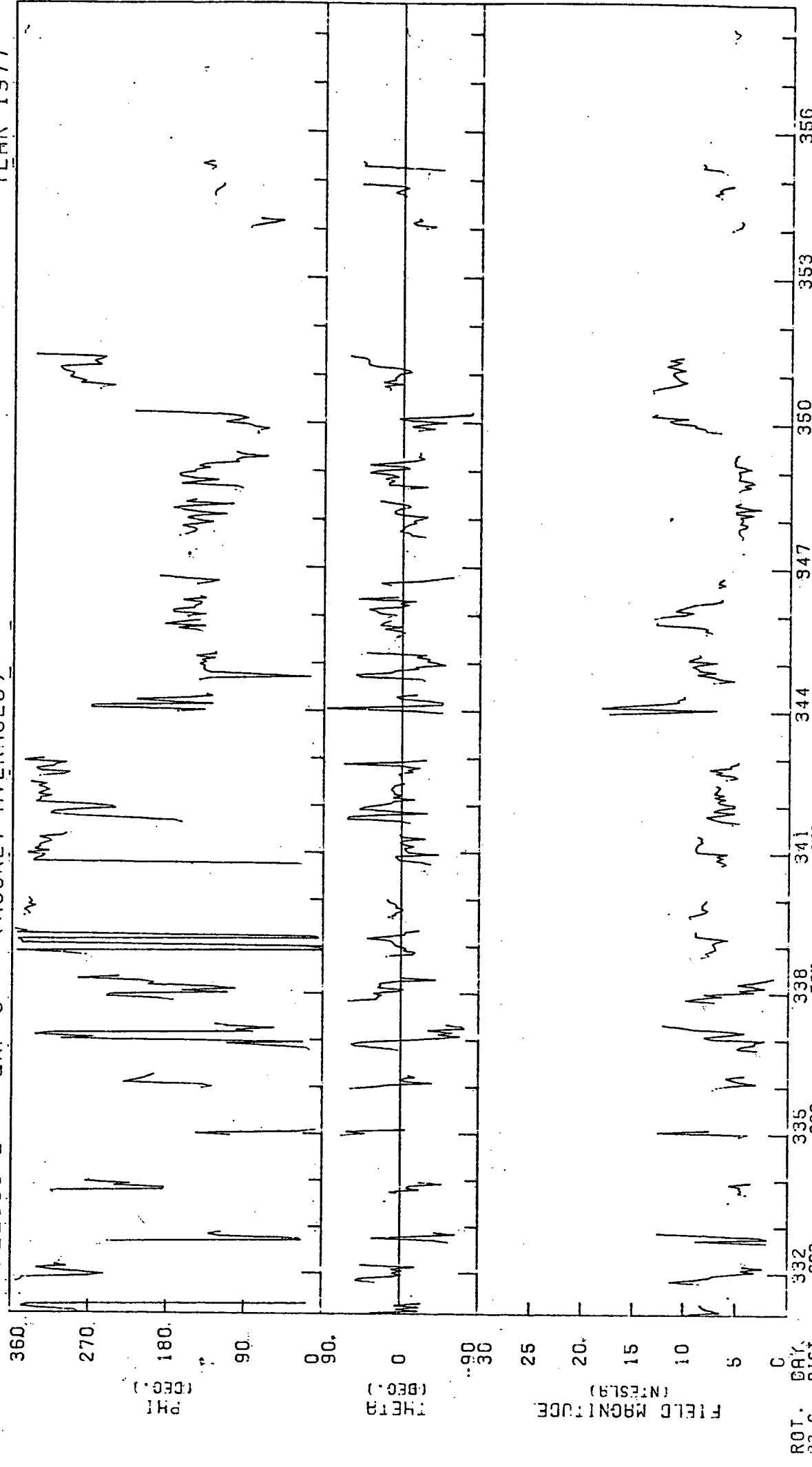
FIELD MAGNITUDE
(INTENSITY)

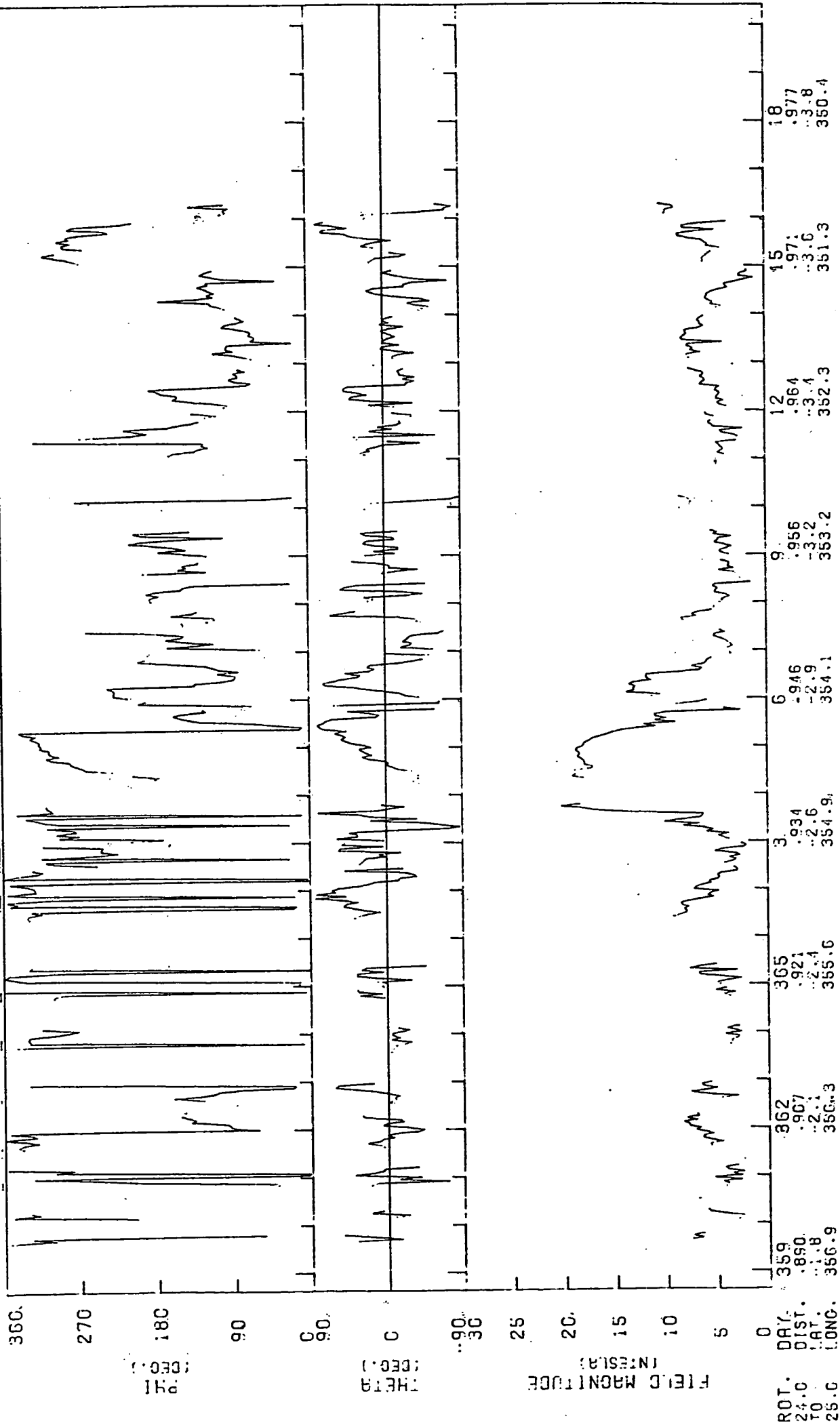
P.A.
(DEG.)

X
(DEG.)

HELIOS 2 EXP 3 (HOURLY AVERAGES)

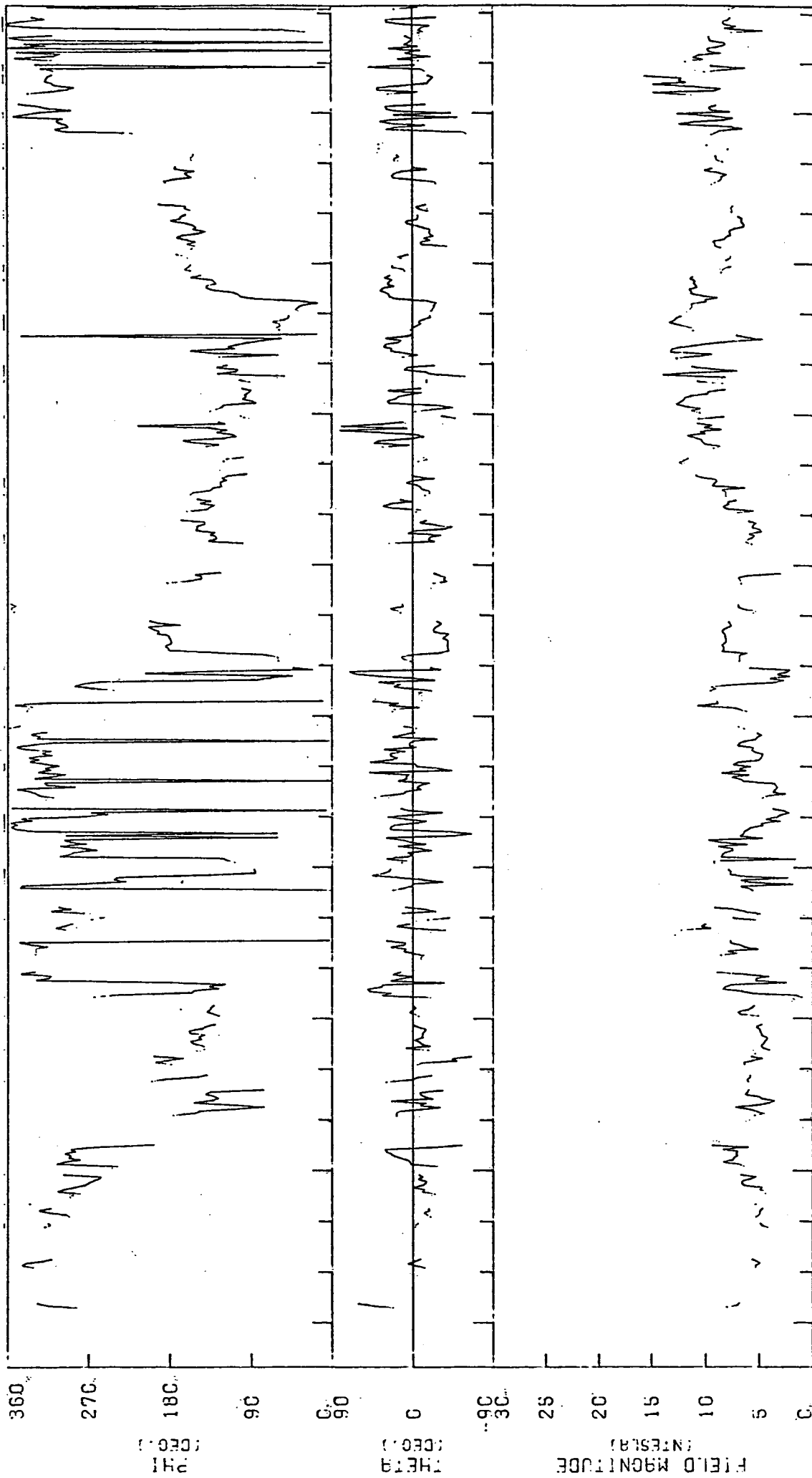
YEAR 1977

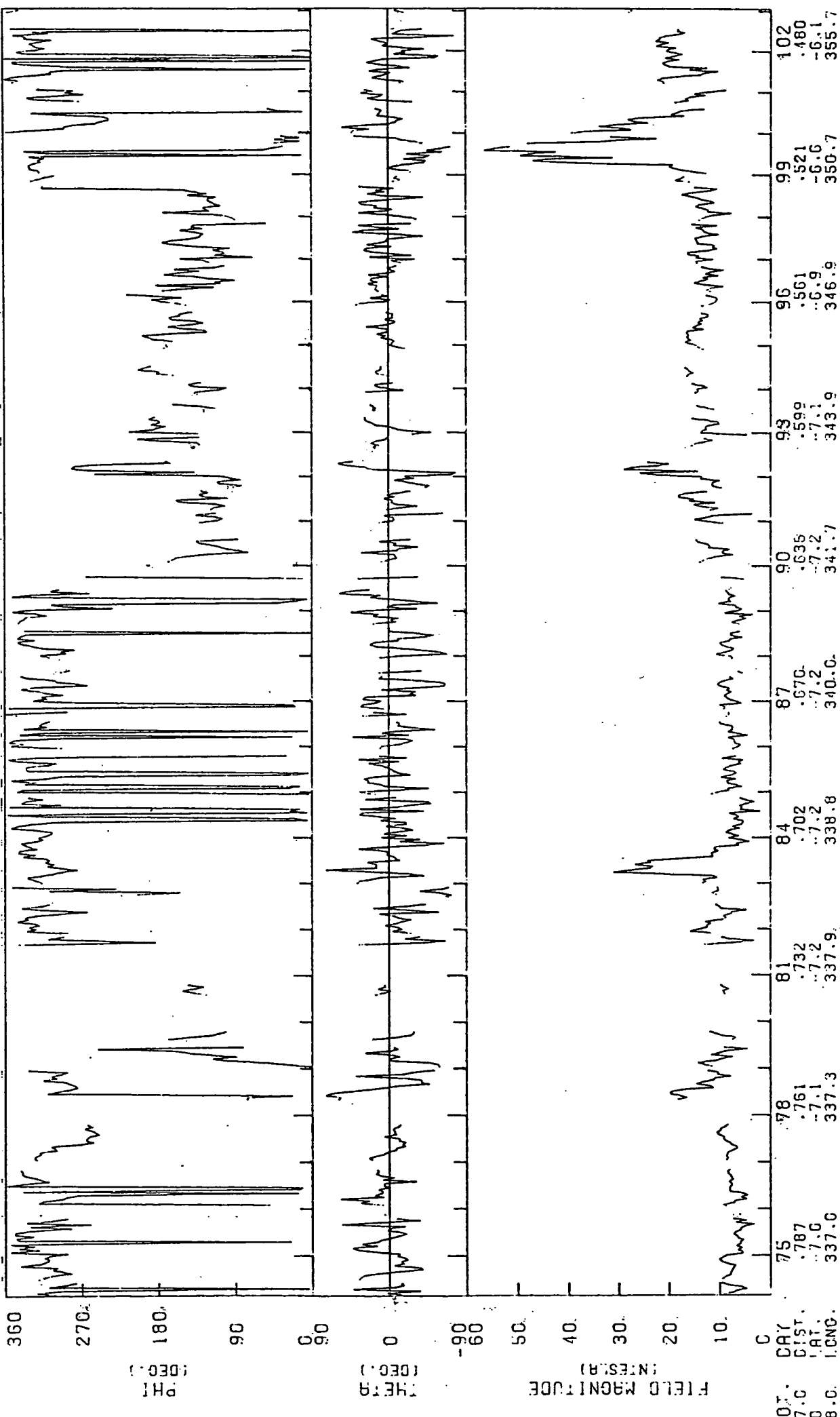




HELIOS 2 EXP 3 (HOURLY AVERAGES)

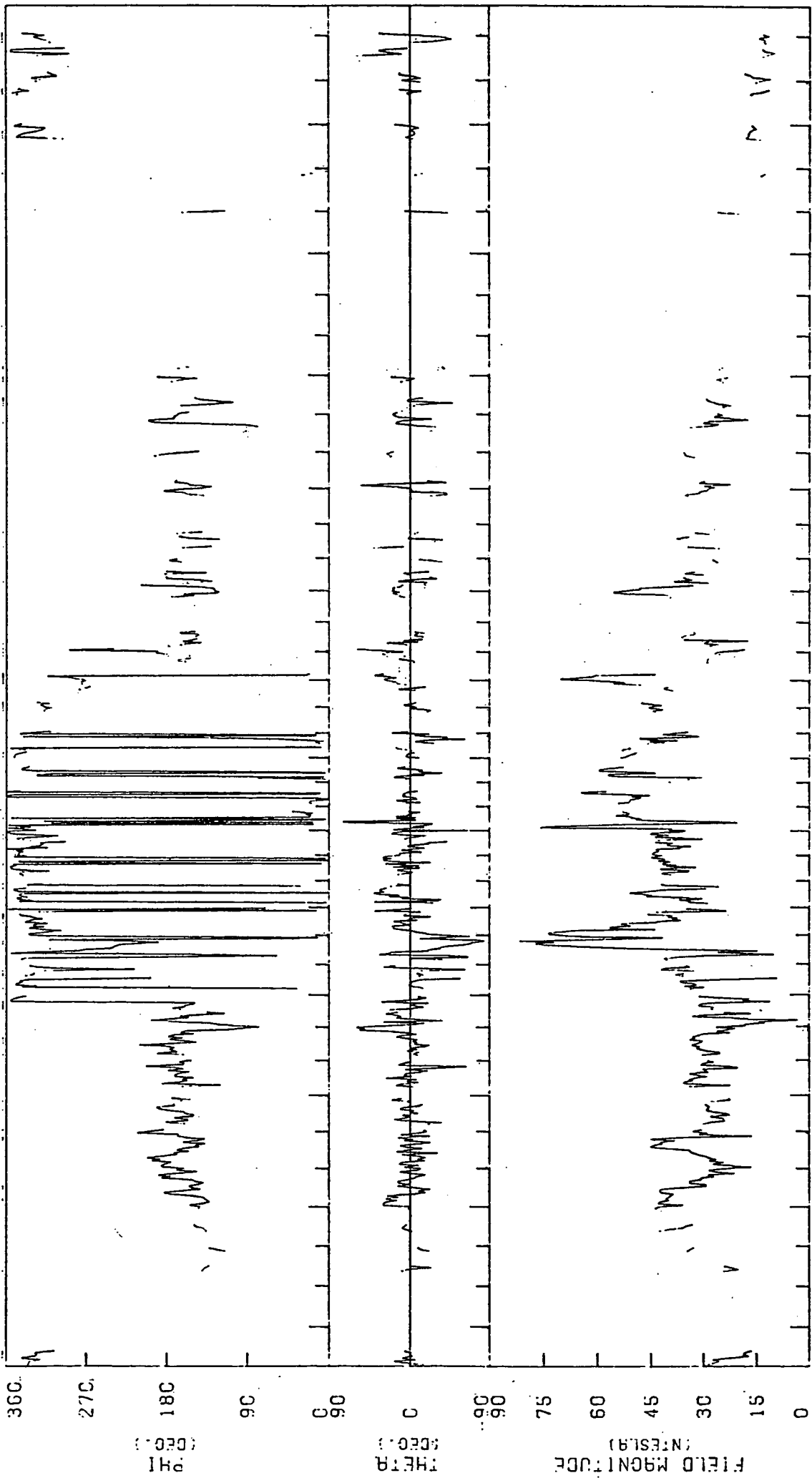
YEAR 1978

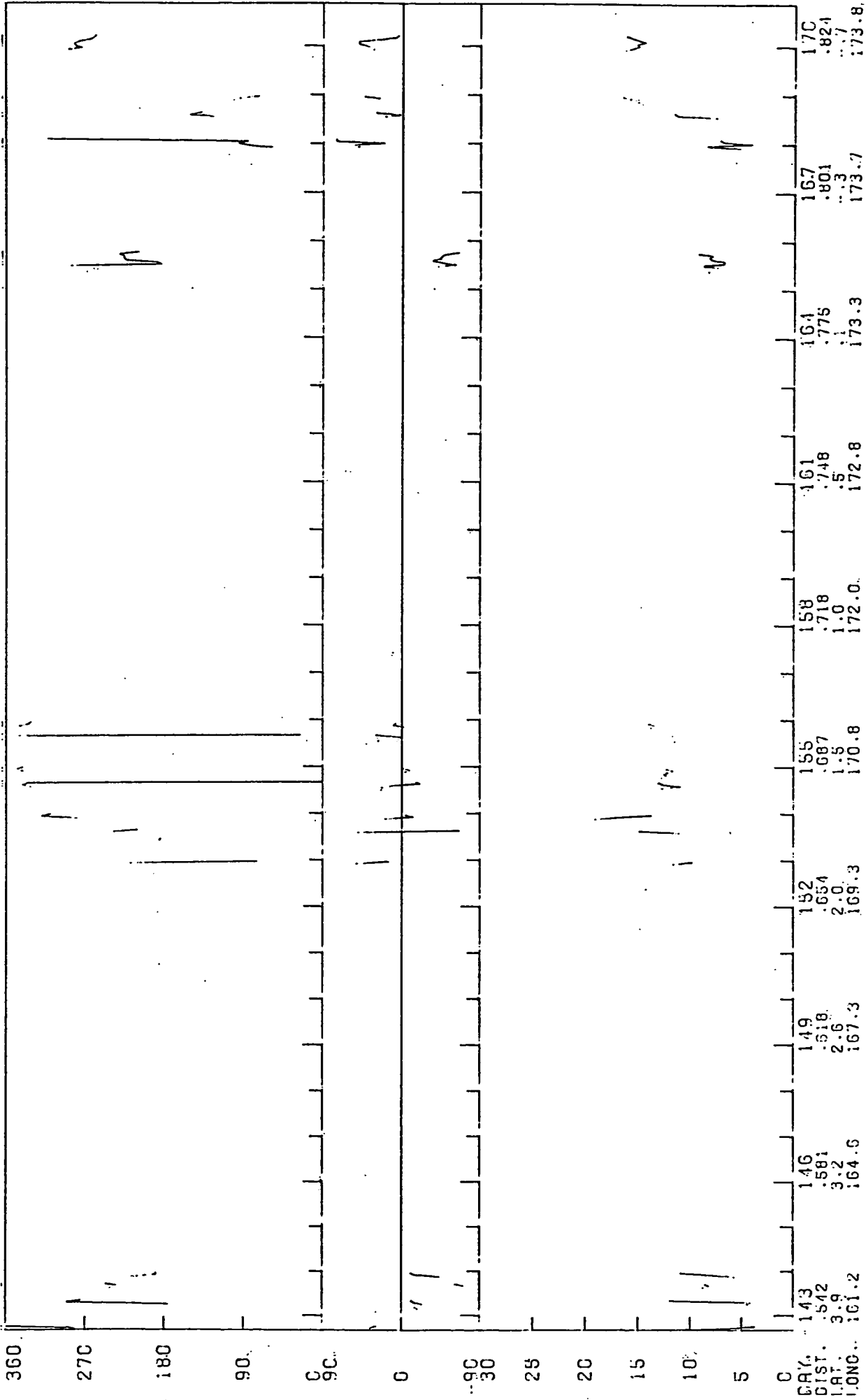




HELIGS 2 EXP 3 (HOURLY AVERAGES)

YEAR 1978

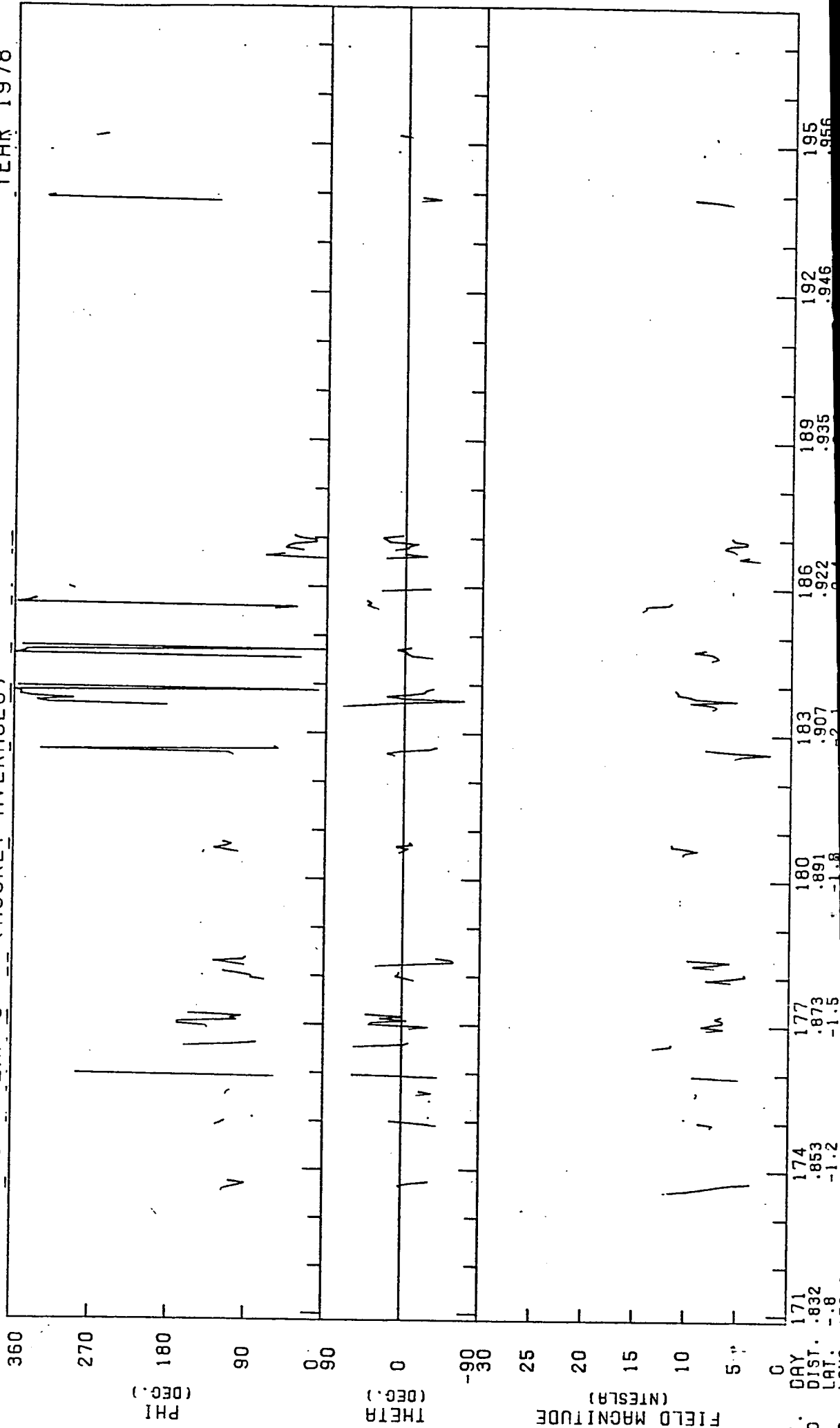


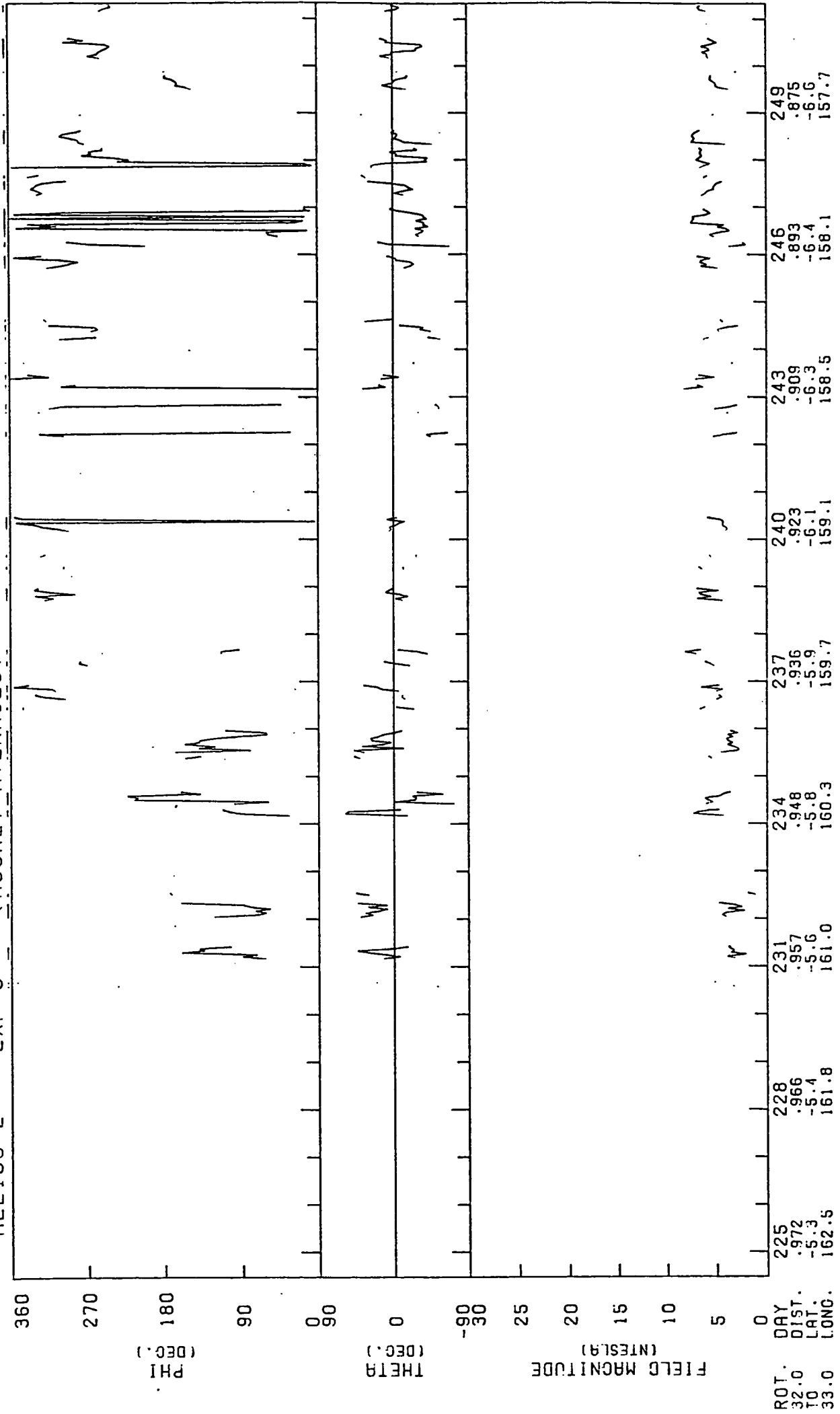


ROT.	143	146	149	152	155	158	161	164	167	170
29.0	542	581	518	654	687	718	748	775	801	824
17C	3.9	3.2	2.6	2.0	1.5	1.0	.5	.1	-.3	-.7
17C.C	161.2	164.6	167.3	169.3	170.8	172.0	172.8	173.3	173.7	173.8

HELIOS 2 EXP 3 (HOURLY AVERAGES)

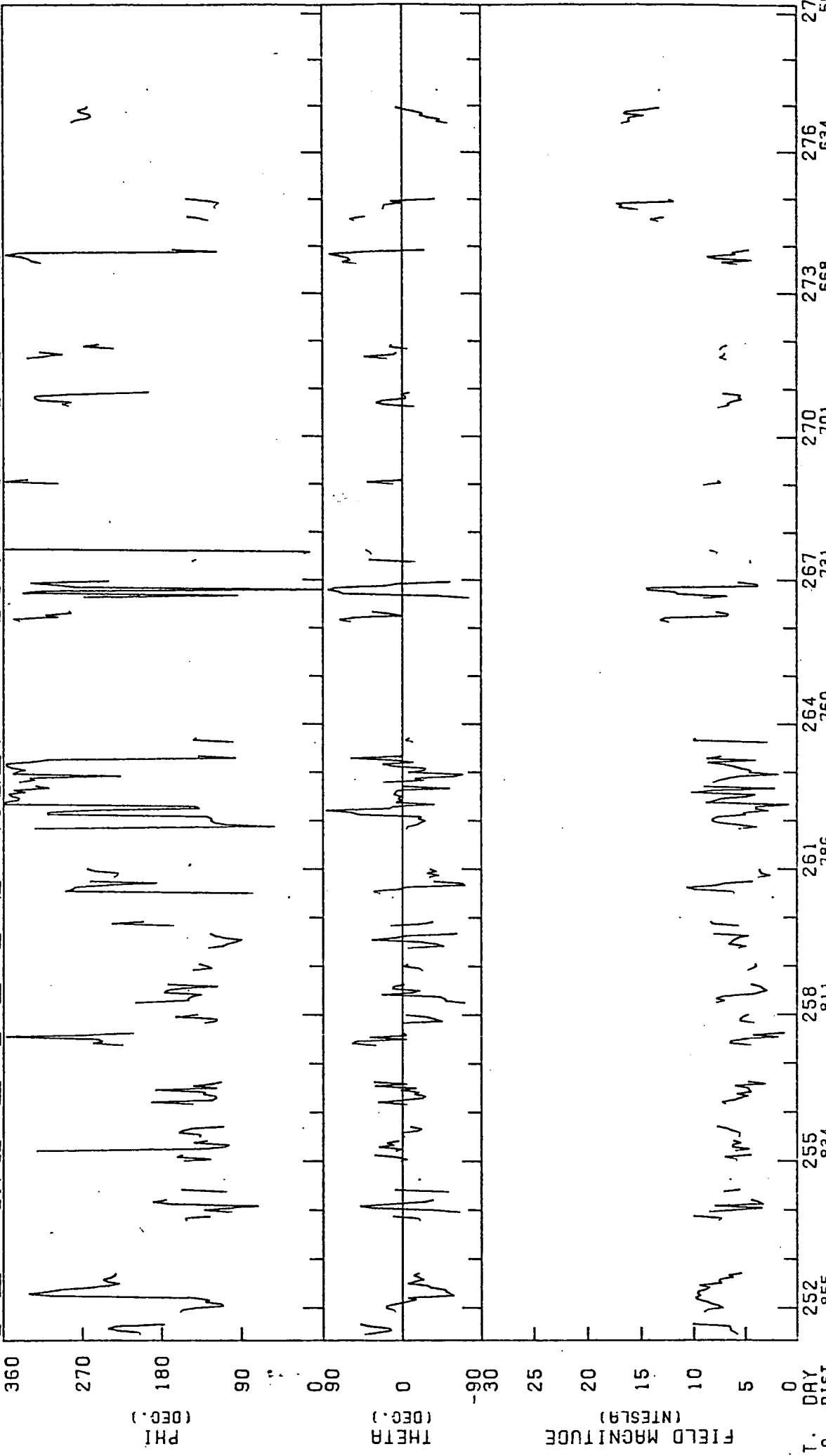
YEAR 1978

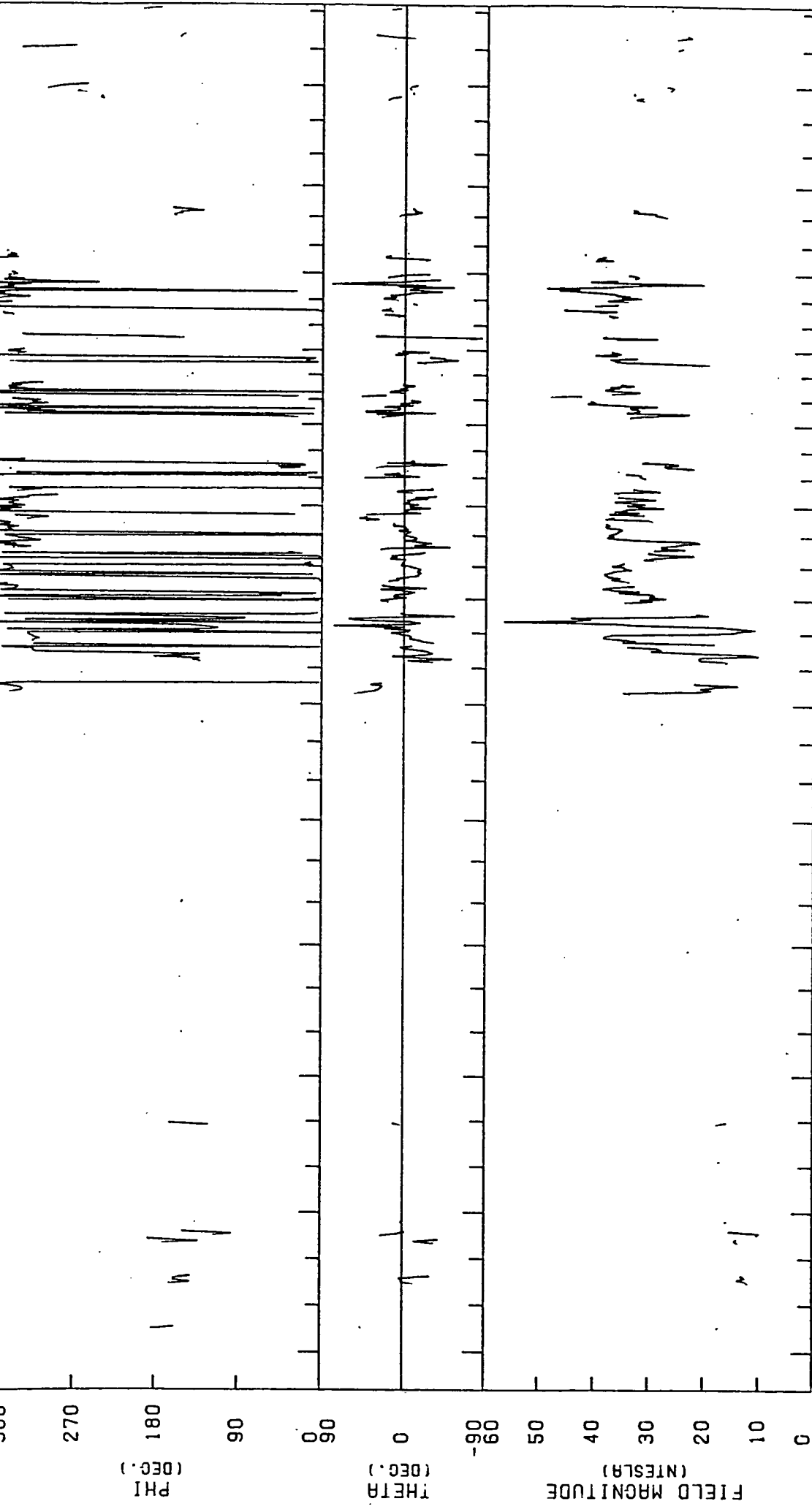




HELIOS 2 EXP 3 (HOURLY AVERAGES)

YEAR 1978

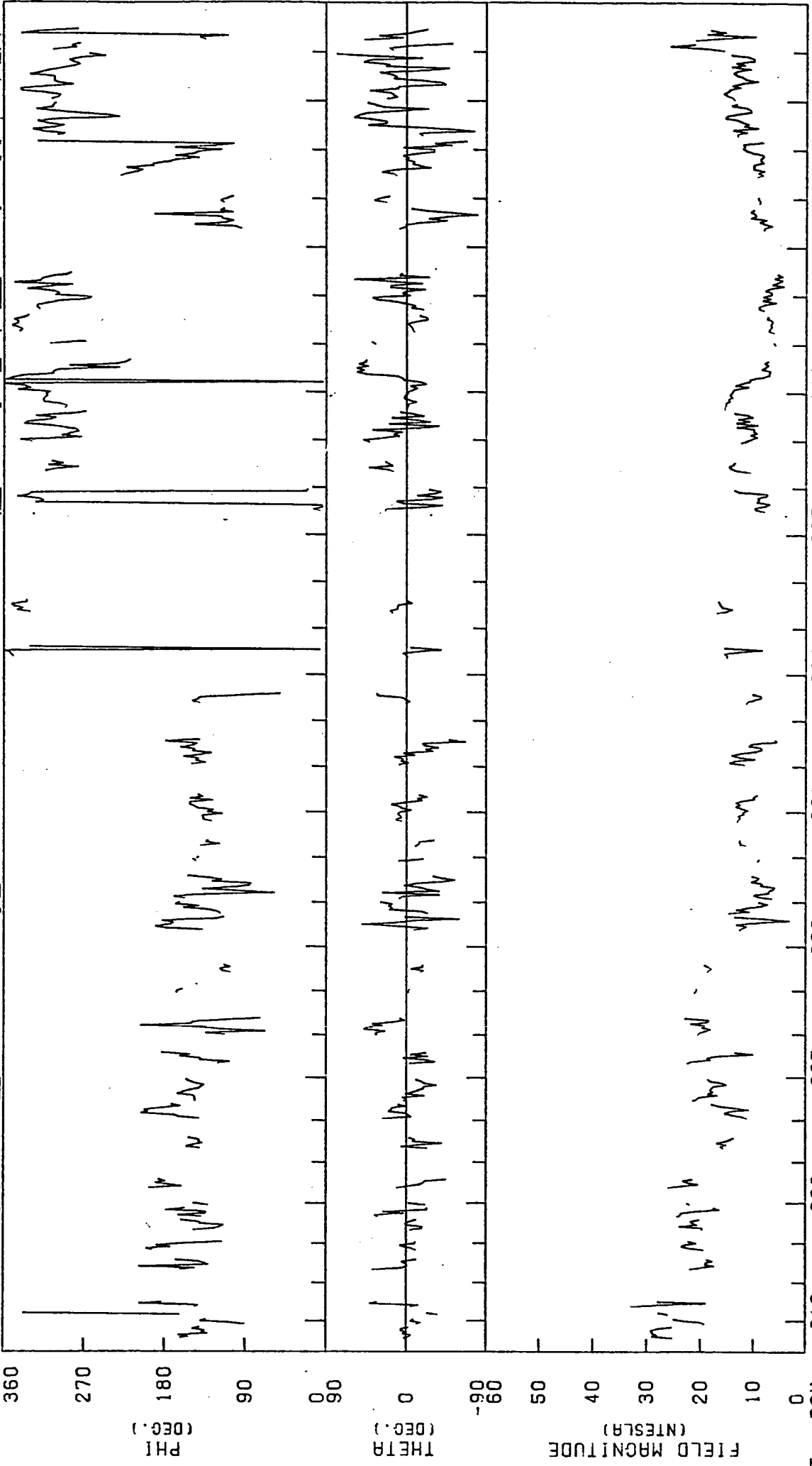


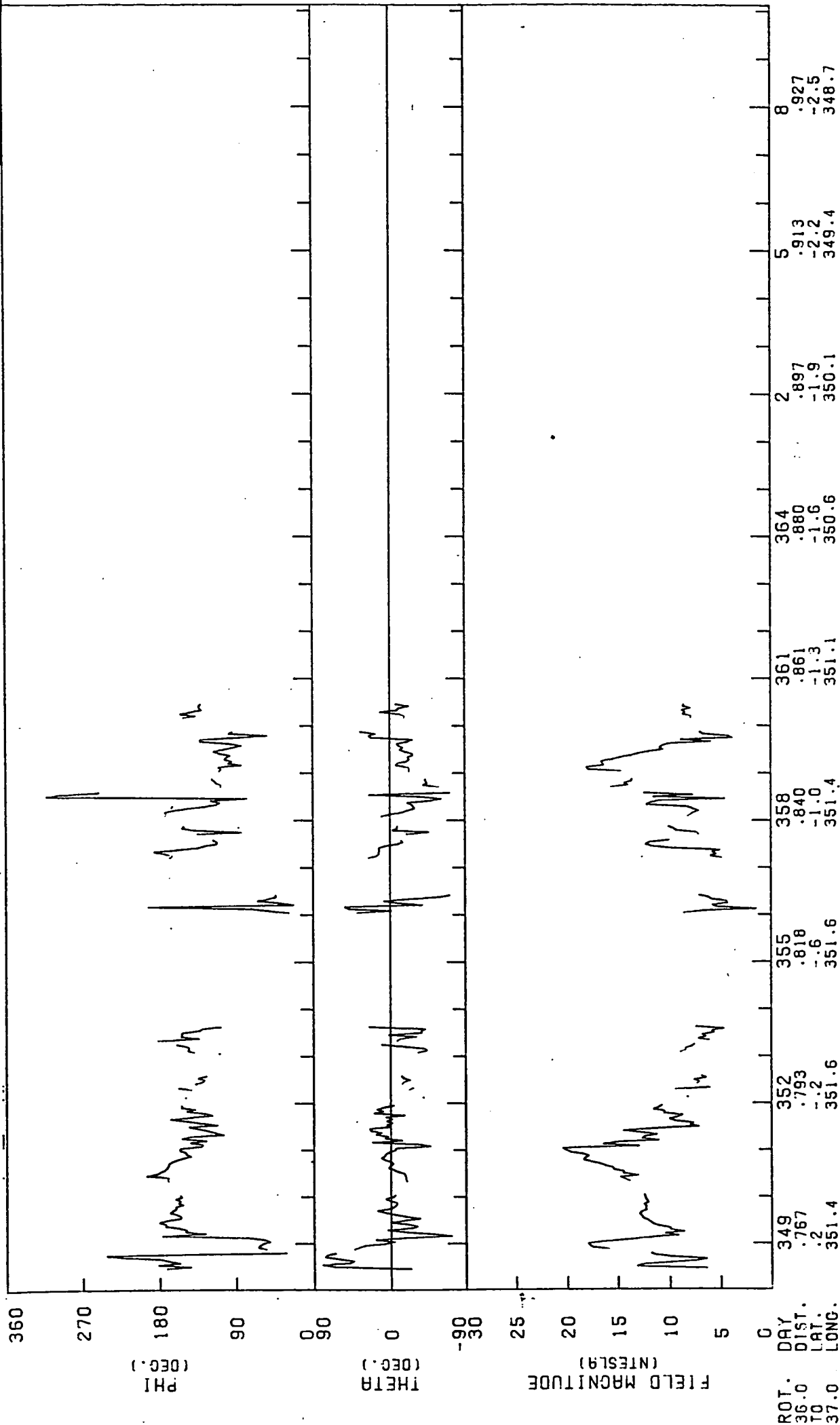


ROT.	34.0	TO	35.0
DIST.	280	283	286
LAT.	585	546	506
LONG.	-7.0	-6.8	-6.5
	165.6	168.8	173.0
			178.5
			185.6
			194.9
			207.0
			222.4
			241.0
			261.2
			280.7
			297.4
			310.7
			316
			332
			367
			7.0
			7.0
			310.7

HELIOS 2 EXP 3 (HOURLY AVERAGES)

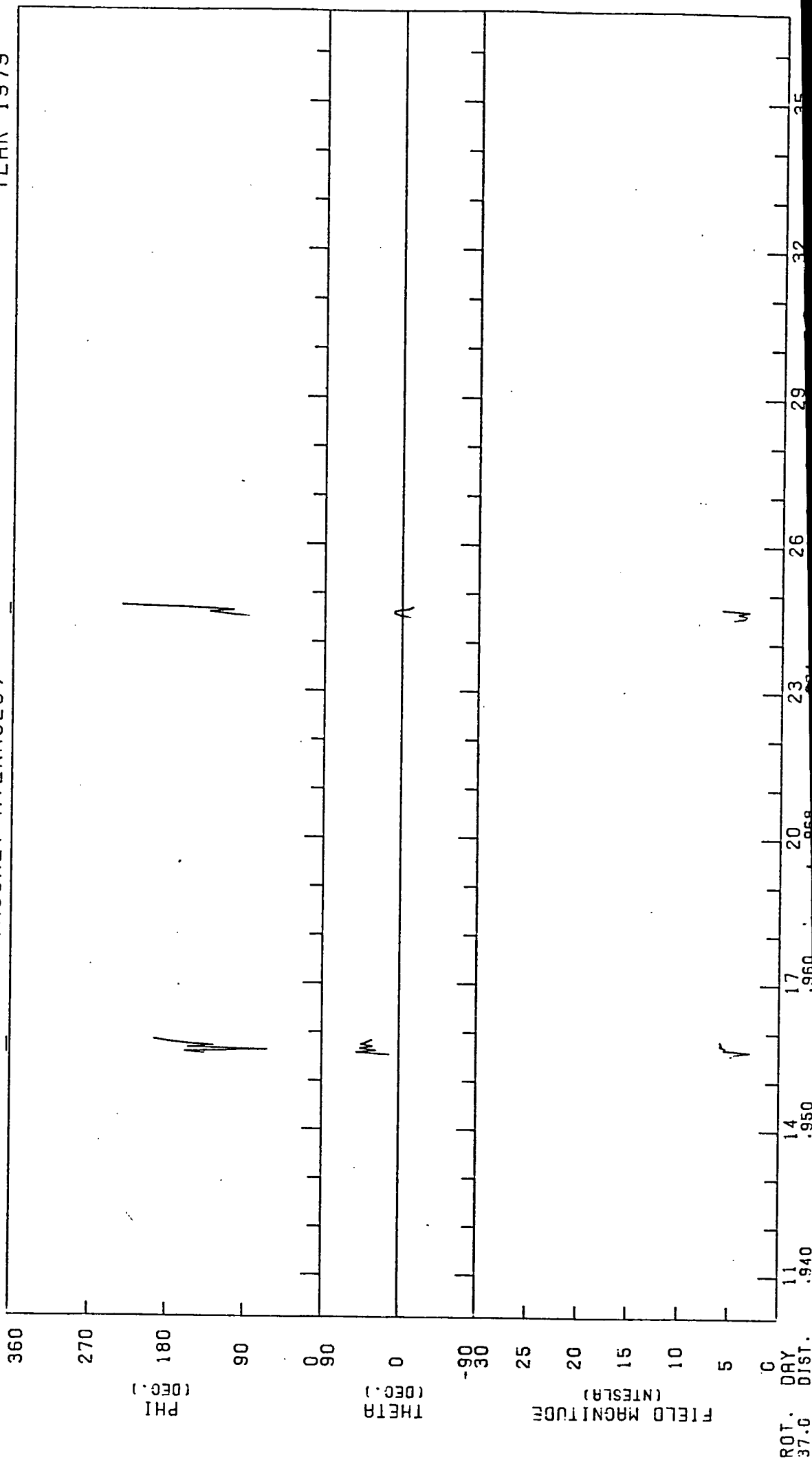
YEAR 1978

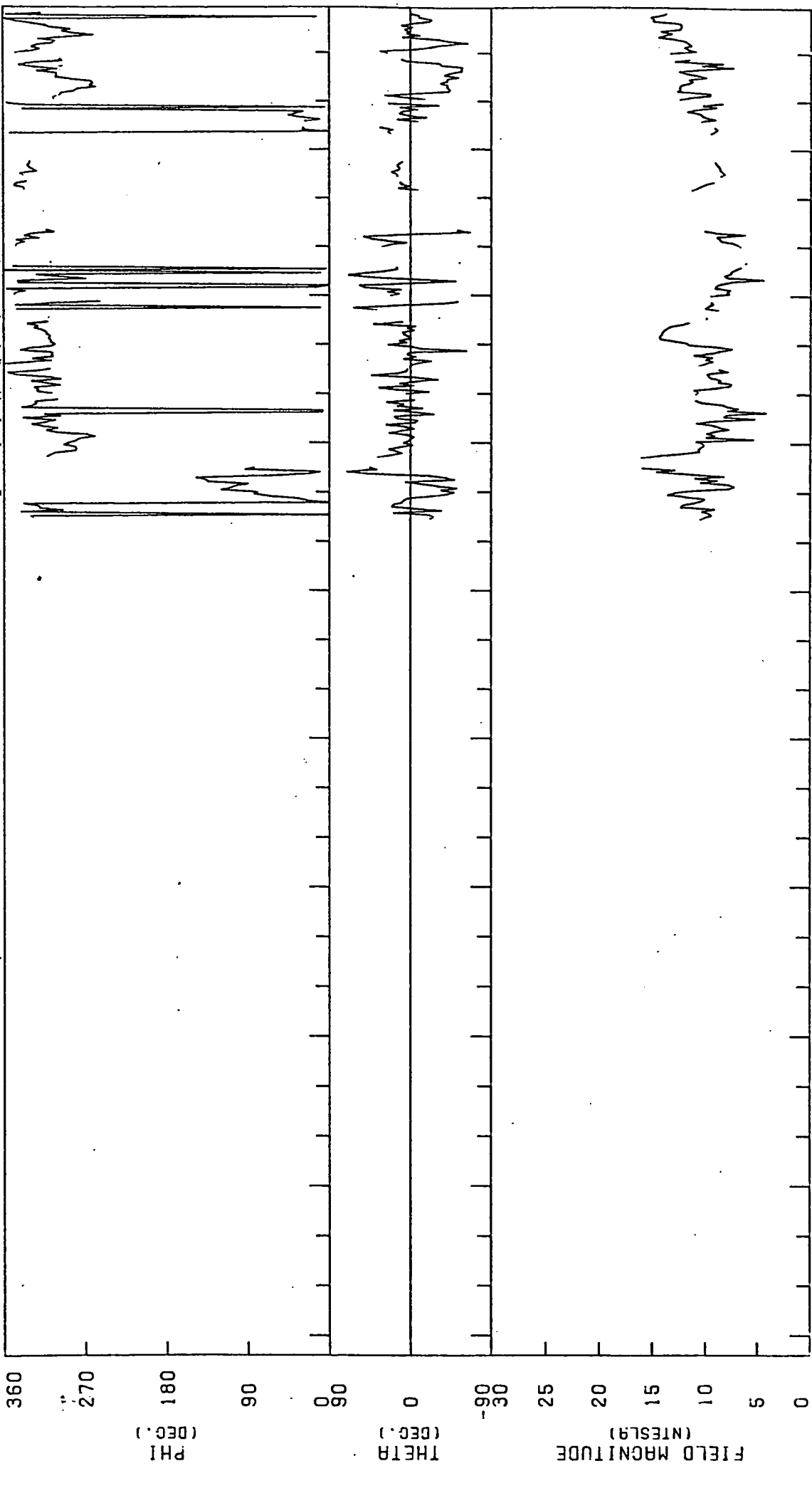




HELIOS 2 EXP 3 (HOURLY AVERAGES)

YEAR 1979

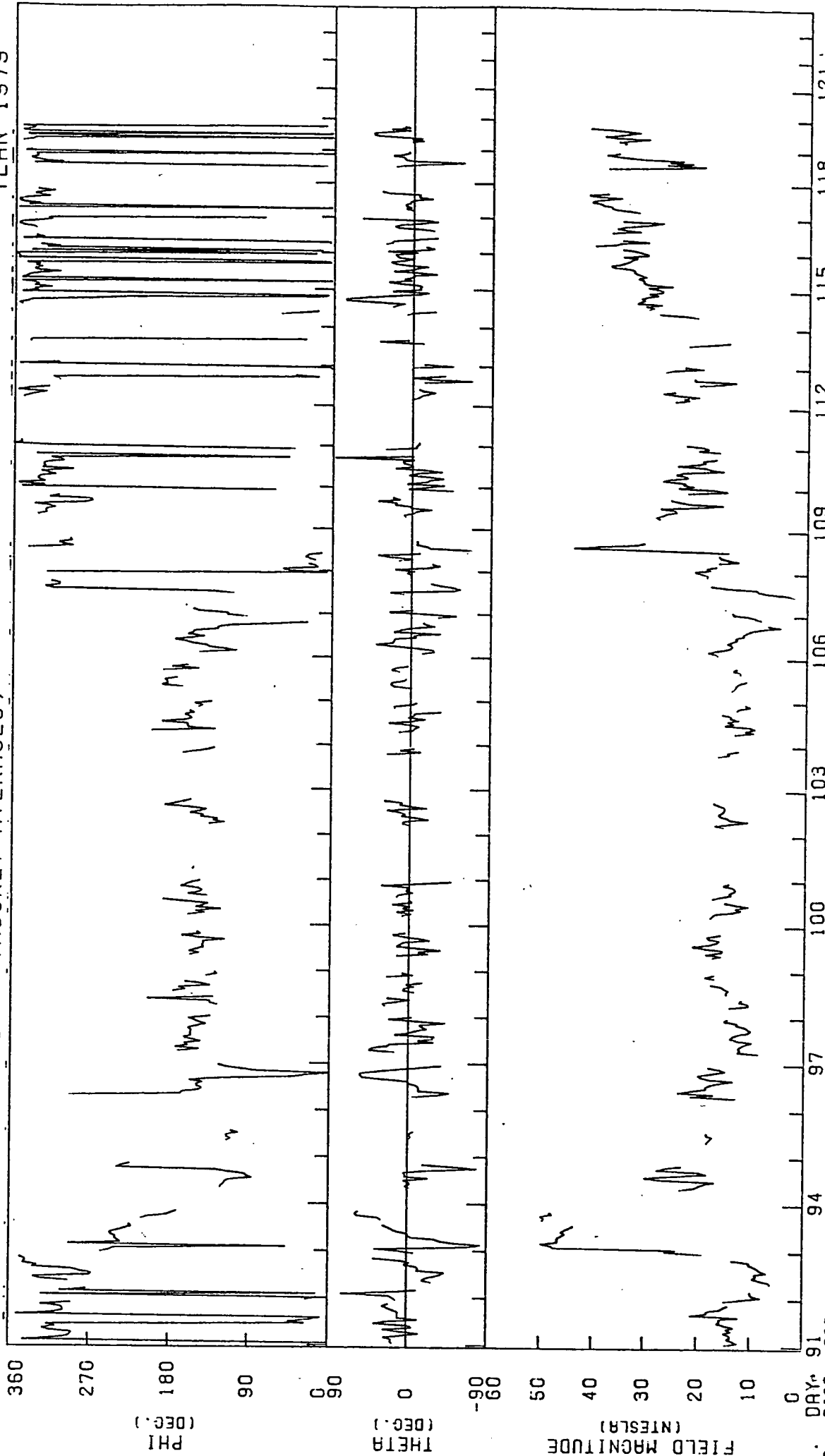


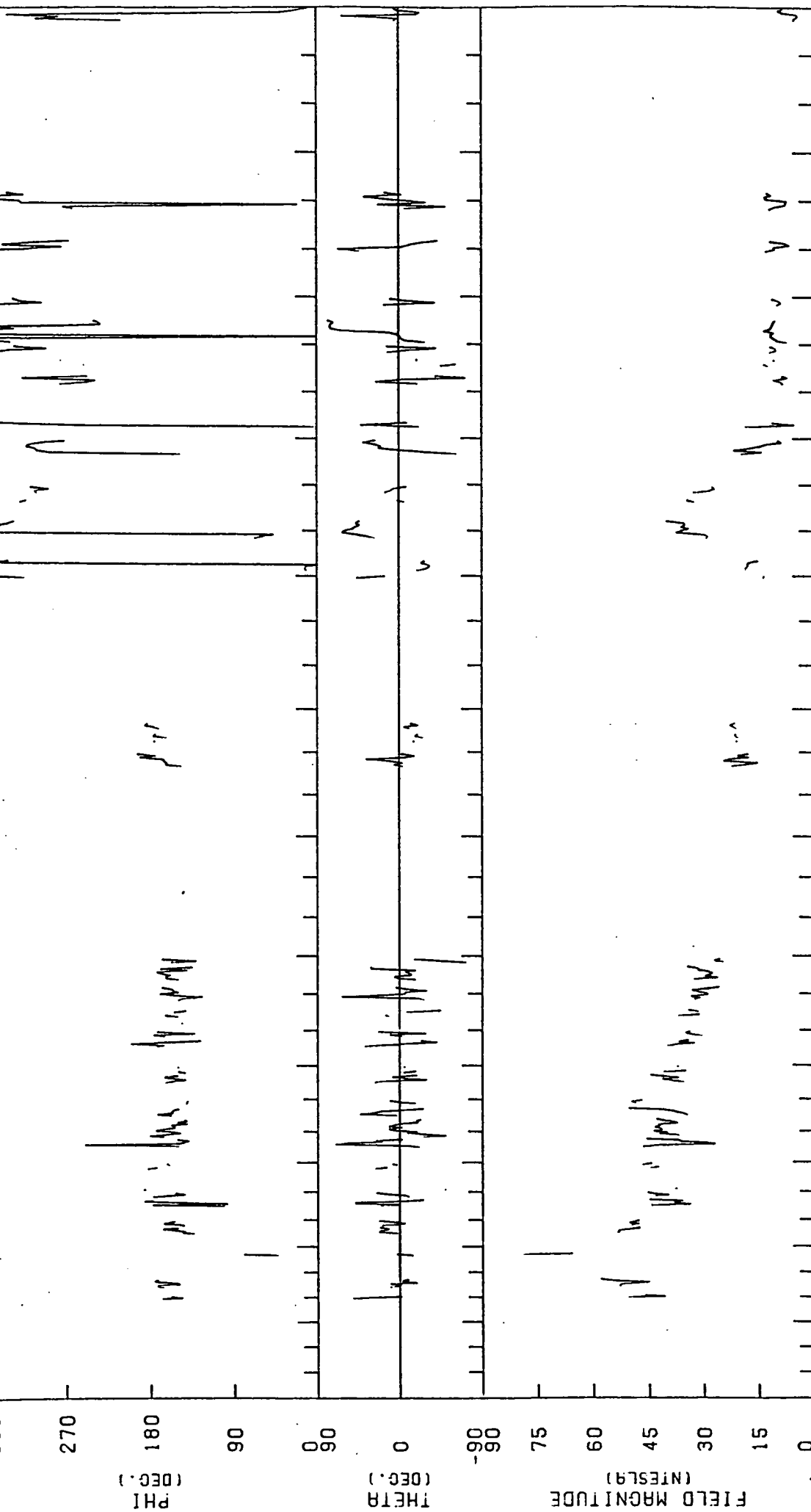


ROT.	39.0	TO	40.0
DIST.	.908		
LAT.	-6.3		
LONG.	332.1		
	64	67	70
	.892	.874	.855
	-6.4	-6.6	-6.7
	331.5	331.0	330.7
		73	76
		.833	.810
		-6.8	-6.9
		330.5	330.4
			79
			.810
			-6.9
			330.4
			82
			.785
			-7.0
			330.6
			85
			.759
			-7.1
			330.9
			88
			.730
			-7.2
			331.5

HELIOS 2 EXP 3 (HOURLY AVERAGES)

YEAR 1979

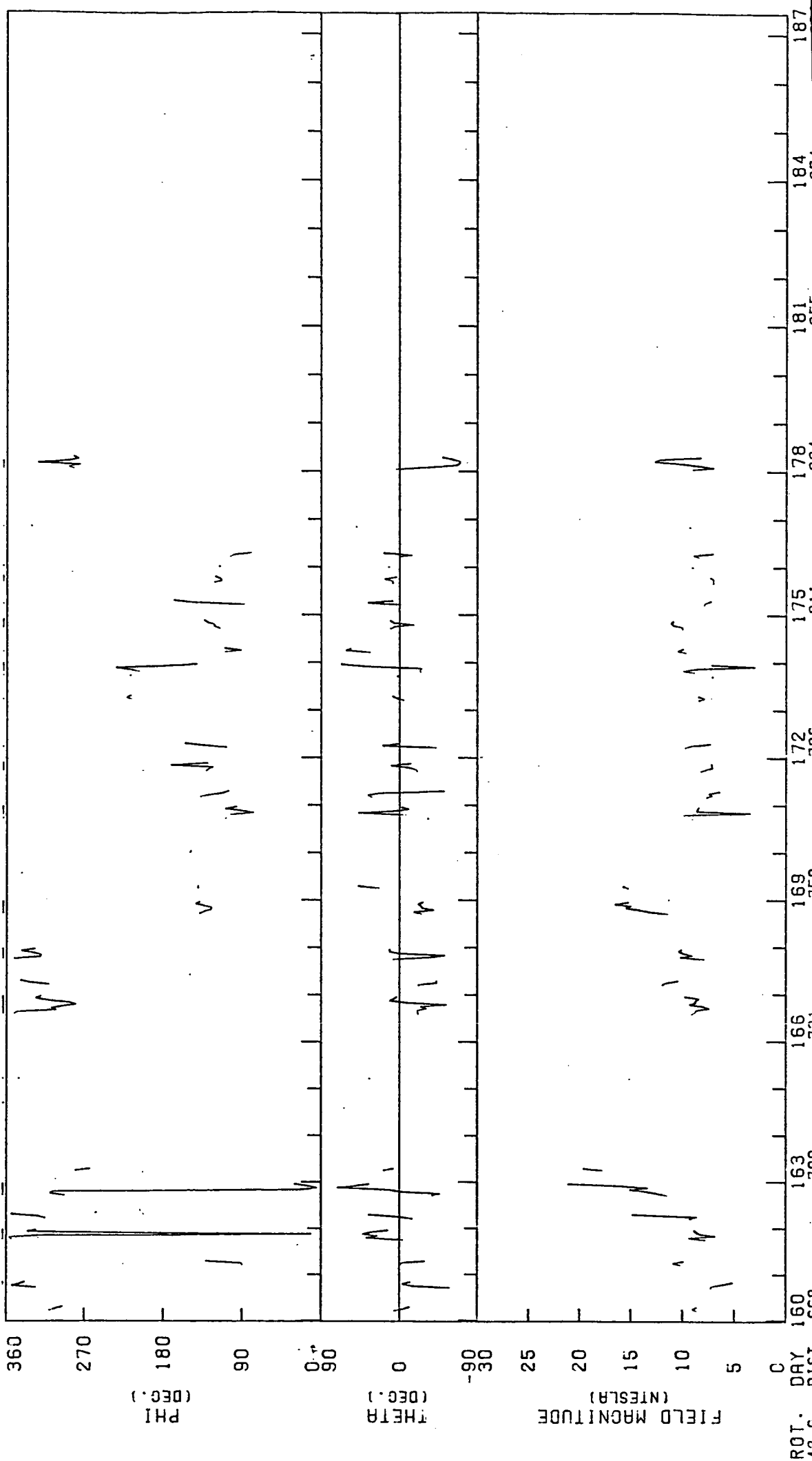


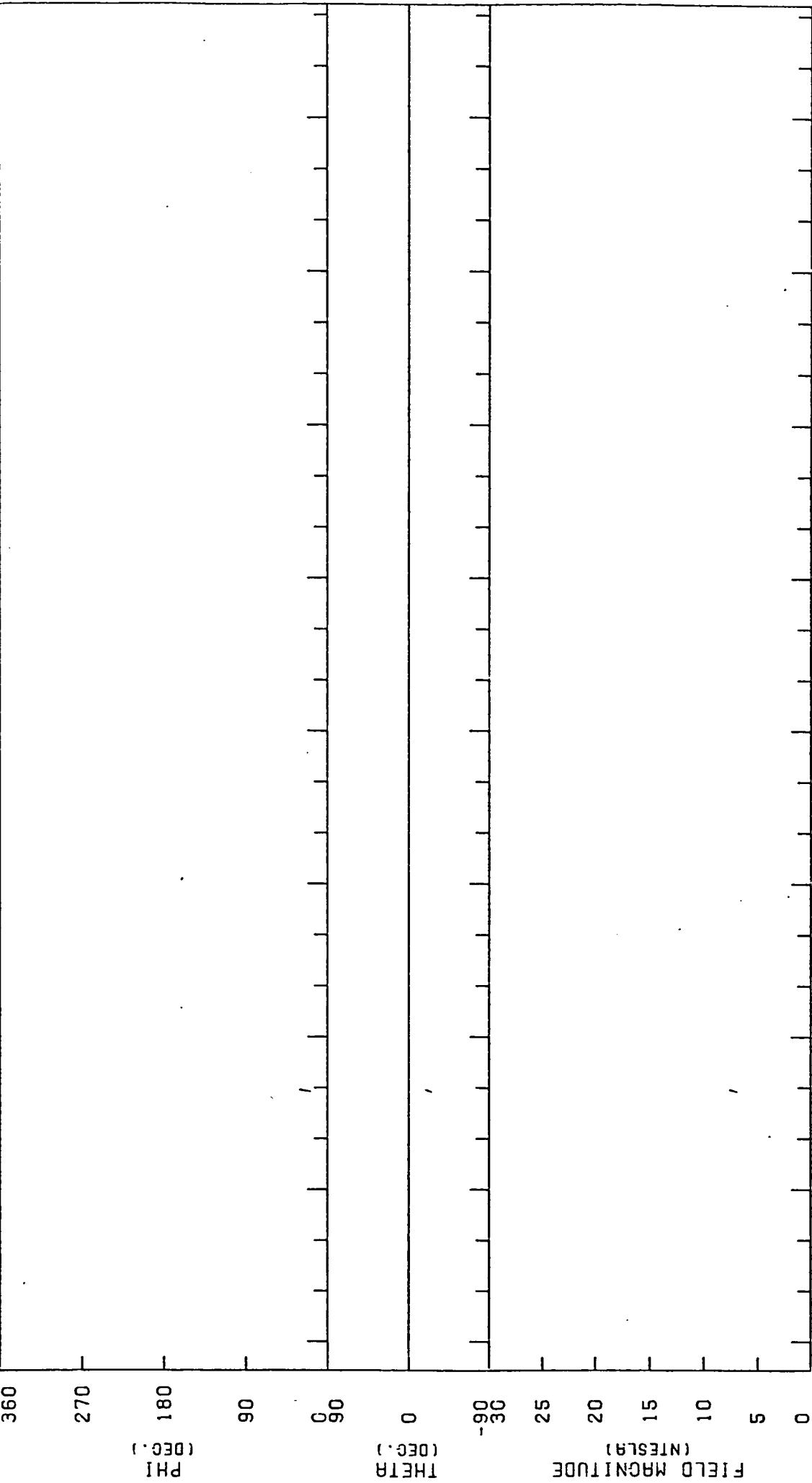


ROT. DAY	124	127	130	133	136	139	142	145	148	151	154	157
41.0	.299	.291	.299	.323	.356	.395	.436	.478	.519	.559	.597	.633
TO	2.0	4.5	6.4	7.2	7.1	6.6	5.9	5.1	4.4	3.6	3.0	2.3
42.0	48.6	68.7	88.8	106.5	120.9	132.2	140.8	147.4	152.6	156.5	159.6	161.9

HELIGS 2 EXP 3 (HOURLY AVERAGES)

YEAR 1979

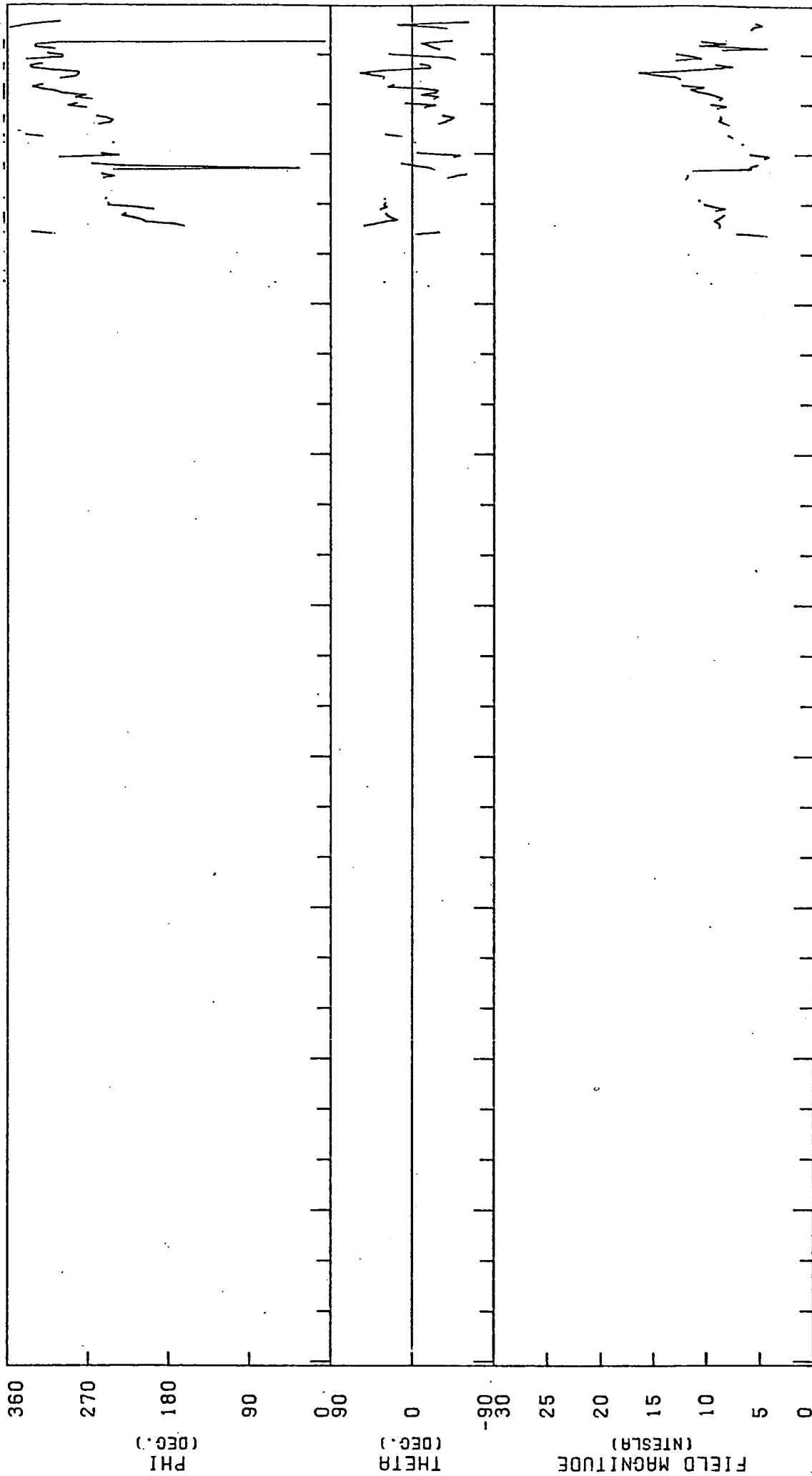




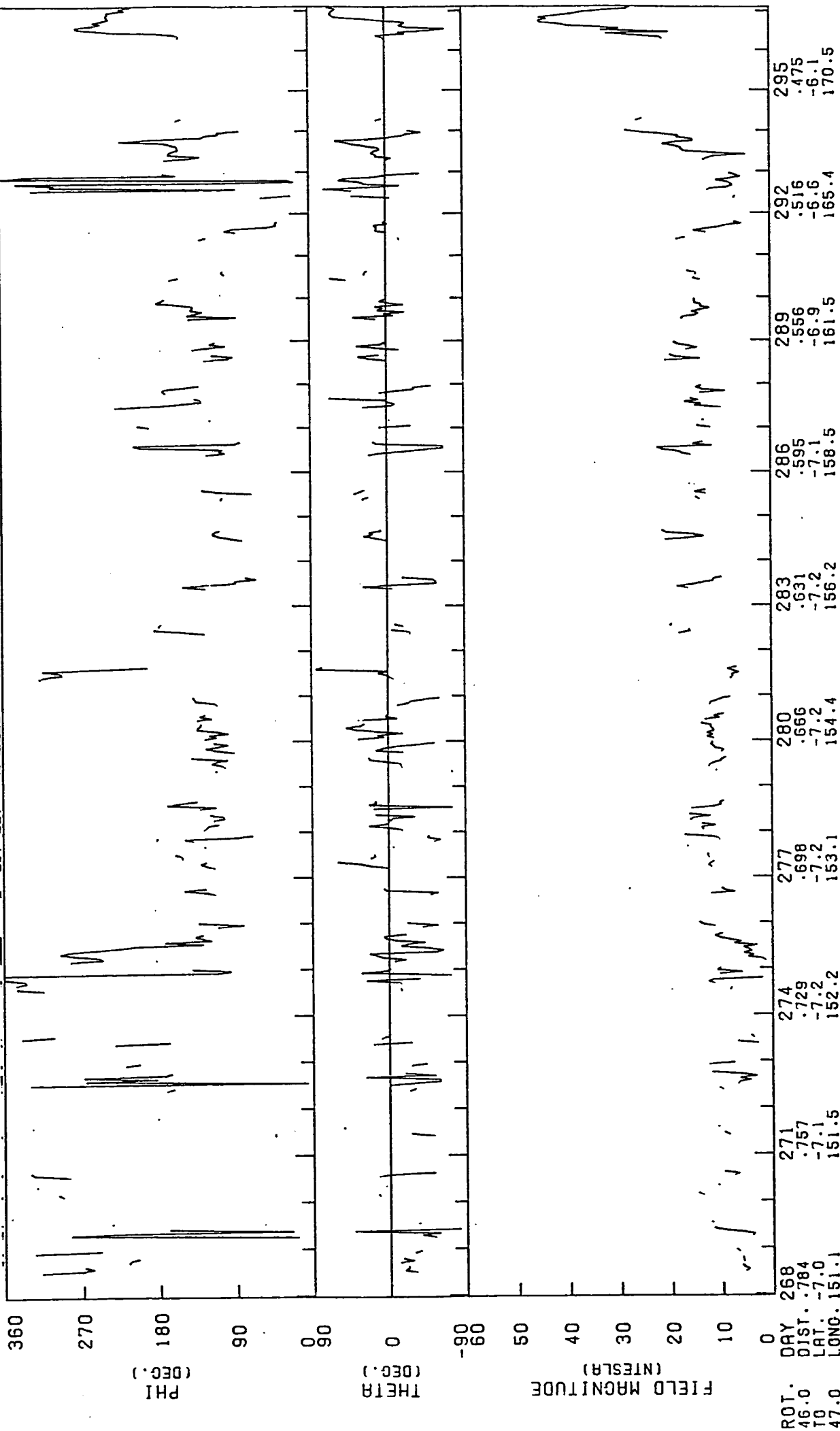
ROT.	43.0	44.0	45.0	46.0	47.0	48.0	49.0	50.0	51.0	52.0	53.0	54.0	55.0	56.0	57.0	58.0	59.0	60.0	61.0	62.0	63.0	64.0	65.0	66.0	67.0	68.0	69.0	70.0	71.0	72.0	73.0	74.0	75.0	76.0	77.0	78.0	79.0	80.0	81.0	82.0	83.0	84.0	85.0	86.0	87.0	88.0	89.0	90.0	91.0	92.0	93.0	94.0	95.0	96.0	97.0	98.0	99.0	100.0	101.0	102.0	103.0	104.0	105.0	106.0	107.0	108.0	109.0	110.0	111.0	112.0	113.0	114.0	115.0	116.0	117.0	118.0	119.0	120.0	121.0	122.0	123.0	124.0	125.0	126.0	127.0	128.0	129.0	130.0	131.0	132.0	133.0	134.0	135.0	136.0	137.0	138.0	139.0	140.0	141.0	142.0	143.0	144.0	145.0	146.0	147.0	148.0	149.0	150.0	151.0	152.0	153.0	154.0	155.0	156.0	157.0	158.0	159.0	160.0	161.0	162.0	163.0	164.0	165.0	166.0	167.0	168.0	169.0	170.0	171.0	172.0	173.0	174.0	175.0	176.0	177.0	178.0	179.0	180.0	181.0	182.0	183.0	184.0	185.0	186.0	187.0	188.0	189.0	190.0	191.0	192.0	193.0	194.0	195.0	196.0	197.0	198.0	199.0	200.0	201.0	202.0	203.0	204.0	205.0	206.0	207.0	208.0	209.0	210.0	211.0	212.0	213.0	214.0	215.0	216.0	217.0	218.0	219.0	220.0	221.0	222.0	223.0	224.0	225.0	226.0	227.0	228.0	229.0	230.0	231.0	232.0	233.0	234.0	235.0	236.0	237.0	238.0	239.0	240.0	241.0	242.0	243.0	244.0	245.0	246.0	247.0	248.0	249.0	250.0	251.0	252.0	253.0	254.0	255.0	256.0	257.0	258.0	259.0	260.0	261.0	262.0	263.0	264.0	265.0	266.0	267.0	268.0	269.0	270.0	271.0	272.0	273.0	274.0	275.0	276.0	277.0	278.0	279.0	280.0	281.0	282.0	283.0	284.0	285.0	286.0	287.0	288.0	289.0	290.0	291.0	292.0	293.0	294.0	295.0	296.0	297.0	298.0	299.0	300.0	301.0	302.0	303.0	304.0	305.0	306.0	307.0	308.0	309.0	310.0	311.0	312.0	313.0	314.0	315.0	316.0	317.0	318.0	319.0	320.0	321.0	322.0	323.0	324.0	325.0	326.0	327.0	328.0	329.0	330.0	331.0	332.0	333.0	334.0	335.0	336.0	337.0	338.0	339.0	340.0	341.0	342.0	343.0	344.0	345.0	346.0	347.0	348.0	349.0	350.0	351.0	352.0	353.0	354.0	355.0	356.0	357.0	358.0	359.0	360.0	361.0	362.0	363.0	364.0	365.0	366.0	367.0	368.0	369.0	370.0	371.0	372.0	373.0	374.0	375.0	376.0	377.0	378.0	379.0	380.0	381.0	382.0	383.0	384.0	385.0	386.0	387.0	388.0	389.0	390.0	391.0	392.0	393.0	394.0	395.0	396.0	397.0	398.0	399.0	400.0	401.0	402.0	403.0	404.0	405.0	406.0	407.0	408.0	409.0	410.0	411.0	412.0	413.0	414.0	415.0	416.0	417.0	418.0	419.0	420.0	421.0	422.0	423.0	424.0	425.0	426.0	427.0	428.0	429.0	430.0	431.0	432.0	433.0	434.0	435.0	436.0	437.0	438.0	439.0	440.0	441.0	442.0	443.0	444.0	445.0	446.0	447.0	448.0	449.0	450.0	451.0	452.0	453.0	454.0	455.0	456.0	457.0	458.0	459.0	460.0	461.0	462.0	463.0	464.0	465.0	466.0	467.0	468.0	469.0	470.0	471.0	472.0	473.0	474.0	475.0	476.0	477.0	478.0	479.0	480.0	481.0	482.0	483.0	484.0	485.0	486.0	487.0	488.0	489.0	490.0	491.0	492.0	493.0	494.0	495.0	496.0	497.0	498.0	499.0	500.0	501.0	502.0	503.0	504.0	505.0	506.0	507.0	508.0	509.0	510.0	511.0	512.0	513.0	514.0	515.0	516.0	517.0	518.0	519.0	520.0	521.0	522.0	523.0	524.0	525.0	526.0	527.0	528.0	529.0	530.0	531.0	532.0	533.0	534.0	535.0	536.0	537.0	538.0	539.0	540.0	541.0	542.0	543.0	544.0	545.0	546.0	547.0	548.0	549.0	550.0	551.0	552.0	553.0	554.0	555.0	556.0	557.0	558.0	559.0	560.0	561.0	562.0	563.0	564.0	565.0	566.0	567.0	568.0	569.0	570.0	571.0	572.0	573.0	574.0	575.0	576.0	577.0	578.0	579.0	580.0	581.0	582.0	583.0	584.0	585.0	586.0	587.0	588.0	589.0	590.0	591.0	592.0	593.0	594.0	595.0	596.0	597.0	598.0	599.0	600.0	601.0	602.0	603.0	604.0	605.0	606.0	607.0	608.0	609.0	610.0	611.0	612.0	613.0	614.0	615.0	616.0	617.0	618.0	619.0	620.0	621.0	622.0	623.0	624.0	625.0	626.0	627.0	628.0	629.0	630.0	631.0	632.0	633.0	634.0	635.0	636.0	637.0	638.0	639.0	640.0	641.0	642.0	643.0	644.0	645.0	646.0	647.0	648.0	649.0	650.0	651.0	652.0	653.0	654.0	655.0	656.0	657.0	658.0	659.0	660.0	661.0	662.0	663.0	664.0	665.0	666.0	667.0	668.0	669.0	670.0	671.0	672.0	673.0	674.0	675.0	676.0	677.0	678.0	679.0	680.0	681.0	682.0	683.0	684.0	685.0	686.0	687.0	688.0	689.0	690.0	691.0	692.0	693.0	694.0	695.0	696.0	697.0	698.0	699.0	700.0	701.0	702.0	703.0	704.0	705.0	706.0	707.0	708.0	709.0	710.0	711.0	712.0	713.0	714.0	715.0	716.0	717.0	718.0	719.0	720.0	721.0	722.0	723.0	724.0	725.0	726.0	727.0	728.0	729.0	730.0	731.0	732.0	733.0	734.0	735.0	736.0	737.0	738.0	739.0	740.0	741.0	742.0	743.0	744.0	745.0	746.0	747.0	748.0	749.0	750.0	751.0	752.0	753.0	754.0	755.0	756.0	757.0	758.0	759.0	760.0	761.0	762.0	763.0	764.0	765.0	766.0	767.0	768.0	769.0	770.0	771.0	772.0	773.0	774.0	775.0	776.0	777.0	778.0	779.0	780.0	781.0	782.0	783.0	784.0	785.0	786.0	787.0	788.0	789.0	790.0	791.0	792.0	793.0	794.0	795.0	796.0	797.0	798.0	799.0	800.0	801.0	802.0	803.0	804.0	805.0	806.0	807.0	808.0	809.0	810.0	811.0	812.0	813.0	814.0	815.0	816.0	817.0	818.0	819.0	820.0	821.0	822.0	823.0	824.0	825.0	826.0	827.0	828.0	829.0	830.0	831.0	832.0	833.0	834.0	835.0	836.0	837.0	838.0	839.0	840.0	841.0	842.0	843.0	844.0	845.0	846.0	847.0	848.0	849.0	850.0	851.0	852.0	853.0	854.0	855.0	856.0	857.0	858.0	859.0	860.0	861.0	862.0	863.0	864.0	865.0	866.0	867.0	868.0	869.0	870.0	871.0	872.0	873.0	874.0	875.0	876.0	877.0	878.0	879.0	880.0	881.0	882.0	883.0	884.0	885.0	886.0	887.0	888.0	889.0	890.0	891.0	892.0	893.0	894.0	895.0	896.0	897.0	898.0	899.0	900.0	901.0	902.0	903.0	904.0	905.0	906.0	907.0	908.0	909.0	910.0	911.0	912.0	913.0	914.0	915.0	916.0	917.0	918.0	919.0	920.0	921.0	922.0	923.0	924.0	925.0	926.0	927.0	928.0	929.0	930.0	931.0	932.0	933.0	934.0	935.0	936.0	937.0	938.0	939.0	940.0	941.0	942.0	943.0	944.0	945.0	946.0	947.0	948.0	949.0	950.0	951.0	952.0	953.0	954.0	955.0	956.0	957.0	958.0	959.0	960.0	961.0	962.0	963.0	964.0	965.0	966.0	967.0	968.0	969.0	970.0	971.0	972.0	973.0	974.0	975.0	976.0	977.0	978.0	979.0	980.0	981.0	982.0	983.0	984.0	985.0	986.0	987.0	988.0	989.0	990.0	991.0	992.0	993.0	994.0	995.0	996.0	997.0	998.0	999.0	1000.0	1001.0	1002.0	1003.0	1004.0	1005.0	1006.0	1007.0	1008.0	1009.0	1010.0	1011.0	1012.0	1013.0	1014.0	1015.0	1016.0	1017.0	1018.0	1019.0	1020.0	1021.0	1022.0	1023.0	1024.0	1025.0	1026.0	1027.0	1028.0	1029.0	1030.0	1031.0	1032.0	1033.0	1034.0	1035.0	1036.0	1037.0	1038.0	1039.0	1040.0	1041.0	1042.0	1043.0	1044.0	1045.0	1046.0	1047.0	1048.0	1049.0	1050.0	1051.0	1052.0	1053.0	1054.0	1055.0	1056.0	1057.0	1058.0	1059.0	1060.0	1061.0	1062.0	1063.0	1064.0	1065.0	1066.0	1067.0	1068.0	1069.0	1070.0	1071.0	1072.0	1073.0	1074.0	1075.0	1076.0	1077.0	1078.0	1079.0	1080.0	1081.0	1082.0	1083.0	1084.0	1085.0	1086.0	1087.0	1088.0	1089.0	1090.0	1091.0	1092.0	1093.0	1094.0	1095.0	1096.0	1097.0	1098.0	1099.0	1100.0	1101.0	1102.0	1103.0	1104.0	1105.0	1106.0	1107.0	1108.0	1109.0	1110.0	1111.0	1112.0	1113.0	1114.0	1115.0	1116.0	1117.0	1118.0	1119.0	1120.0	1121.0	1122.0	1123.0	1124.0	1125.0	1126.0	1127.0	1128.0	1129.0	1130.0	1131.0	1132.0	1133.0	1134.0	1135.0	1136.0	1137.0	1138.0	1139.0	1140.0	1141.0	1142.0	1143.0	1144.0	1145.0	1146.0	1147.0	1148.0	1149.0	1150.0	1151.0	1152.0	1153.0	1154.0	1155.0	1156.0	1157.0	1158.0	1159.0	1160.0	1161.0	1162.0	1163.0	1164.0	1165.0	1166.0	1167.0	1168.0	1169.0	1170.0	1171.0	1172.0	1173.0	1174.0	1175.0	1176.0	1177.0	1178.0	1179.0	1180.0	1181.0	1182.0	1183.0	1184.0	1185.0	1186.0	1187.0	1188.0	1189.0	1190.0	1191.0	1192.0	1193.0	1194.0	1195.0	1196.0	1197.0	1198.0	1199.0	1200.0	1201.0	1202.0	1203.0	1204.0	1205.0	1206.0	1207.0	1208.0	1209.0	1210.0	1211.0	1212.0	1213.0	1214.0	1215.0	1216.0	1217.0	1218.0	1219.0	1220.0	1221.0	1222.0	1223.0	1224.0	1225.0	1226.0	1227.0	1228.0	1229.0	1230.0	1231.0	1232.0	1233
------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

HELIOS 2 EXP 3 (HOURLY AVERAGES)

YEAR 1979

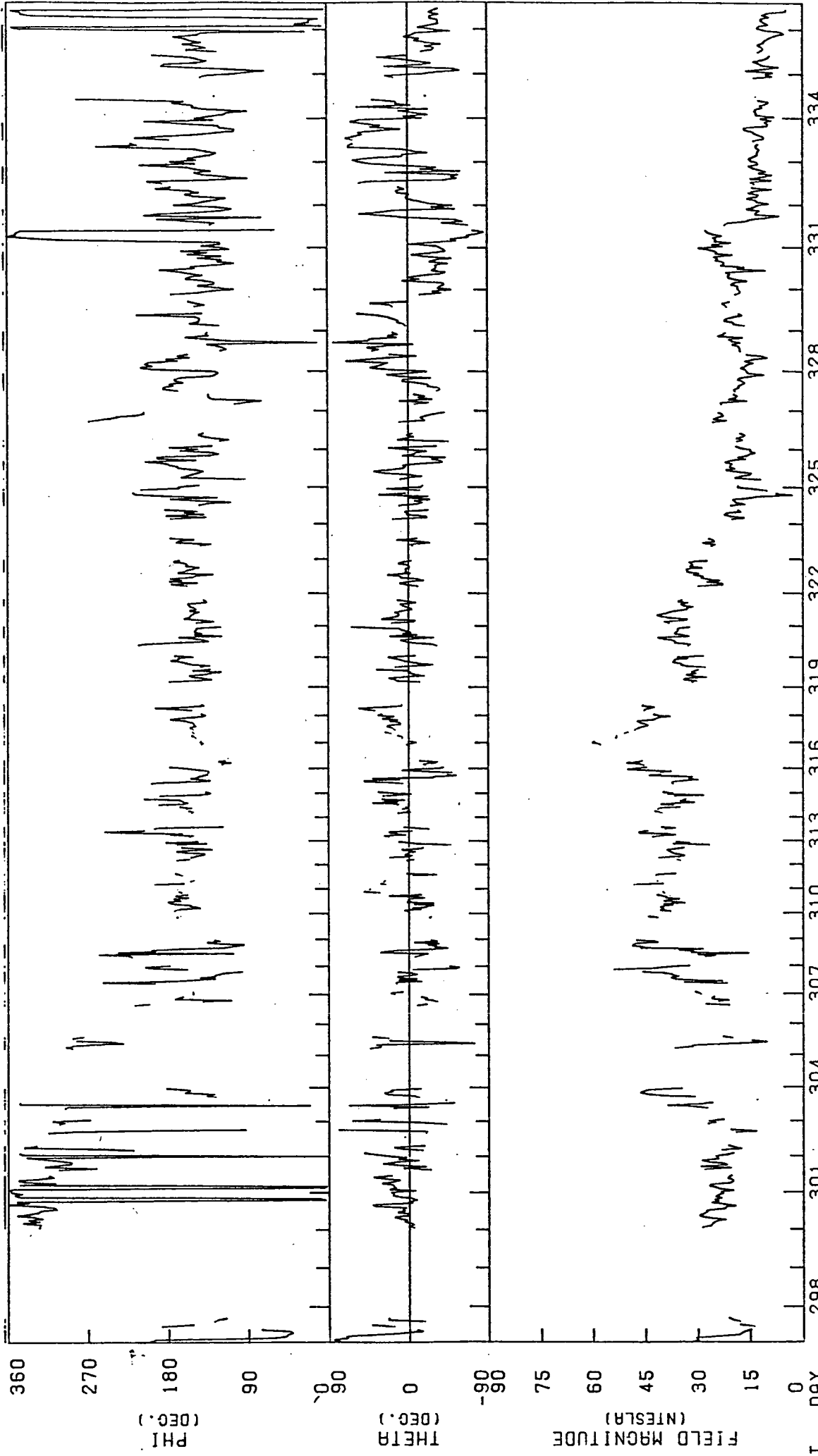


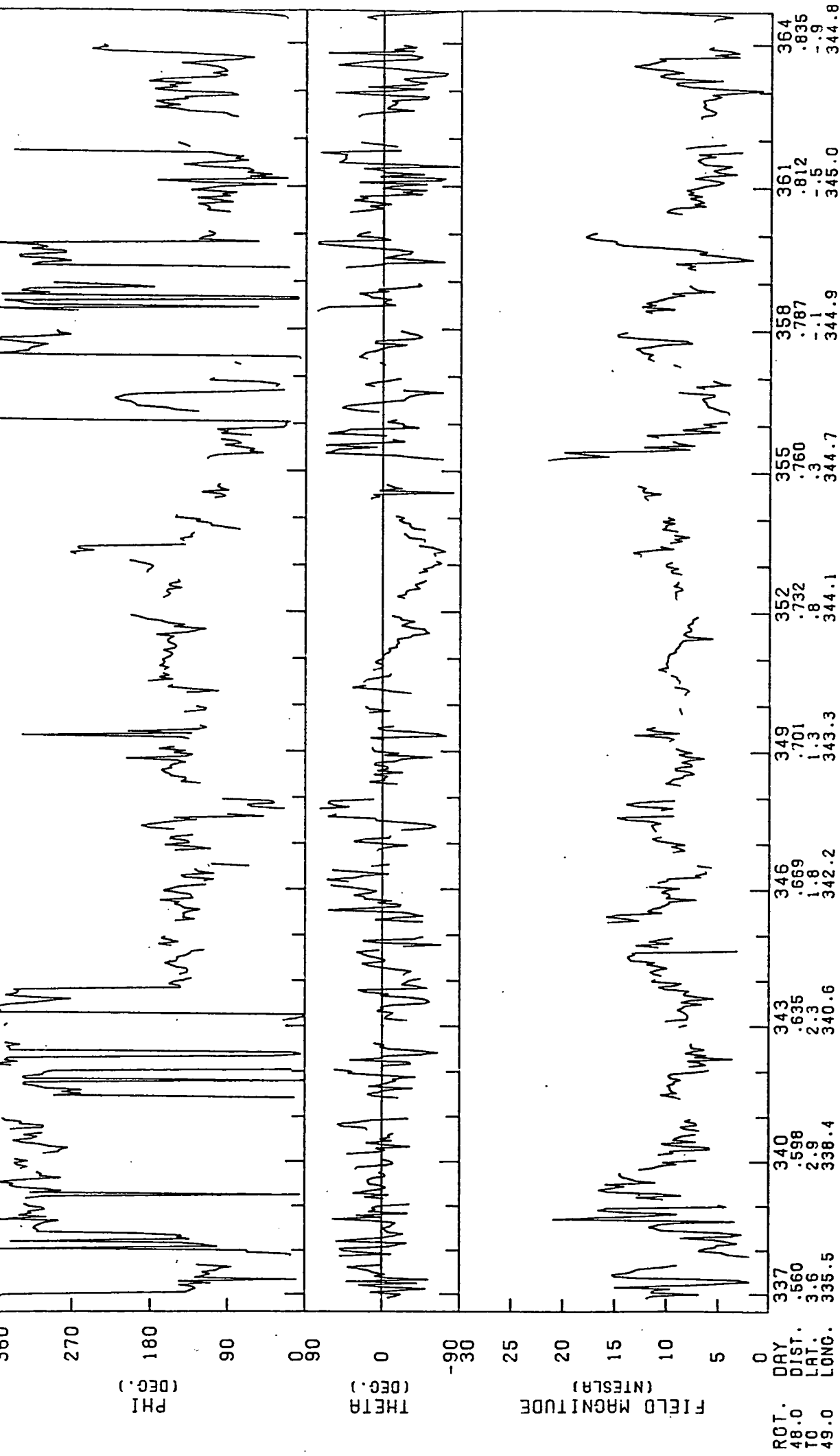
ROT. DAY 241 244 247 250 253 256 259 262 265
45.0 0.947 0.935 0.922 0.908 0.891 0.873 0.854 0.832 0.809
TO 5.8 6.1 6.1 5.3 6.1 6.8 6.7 6.8 6.8



HELIOS 2 EXP 3 (HOURLY AVERAGES)

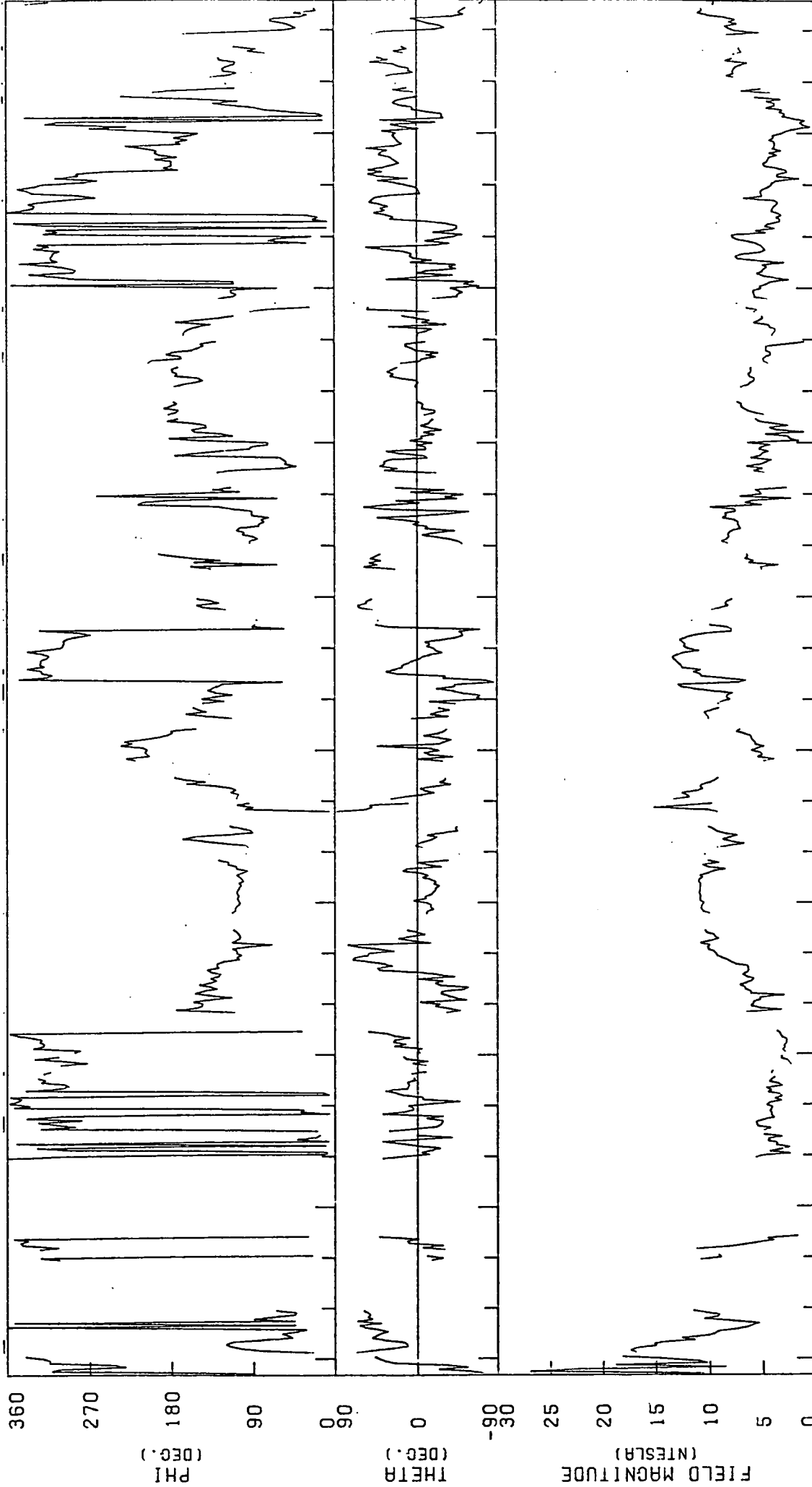
YEAR 1979

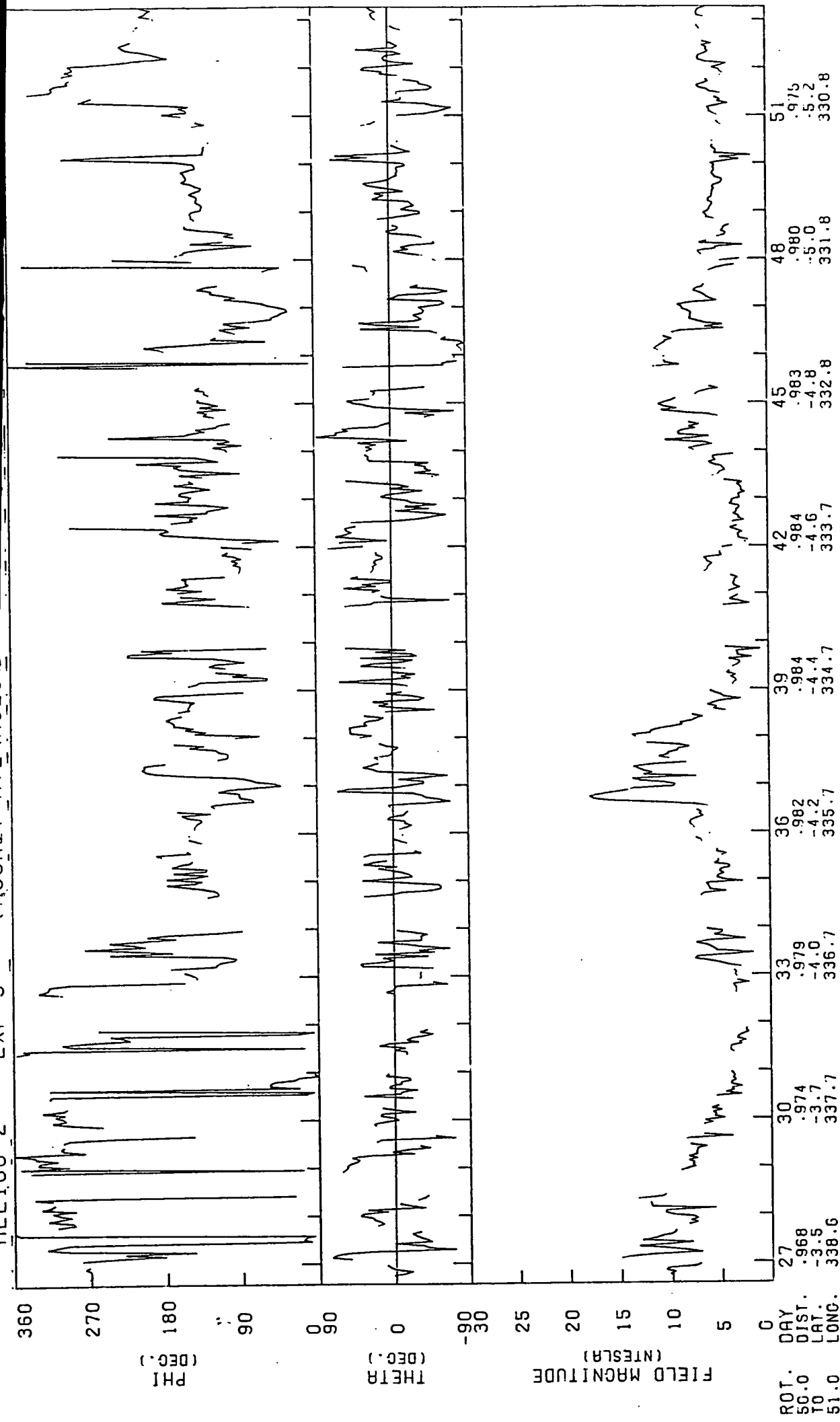




HELIOS 2 EXP 3 (HOURLY AVERAGES)

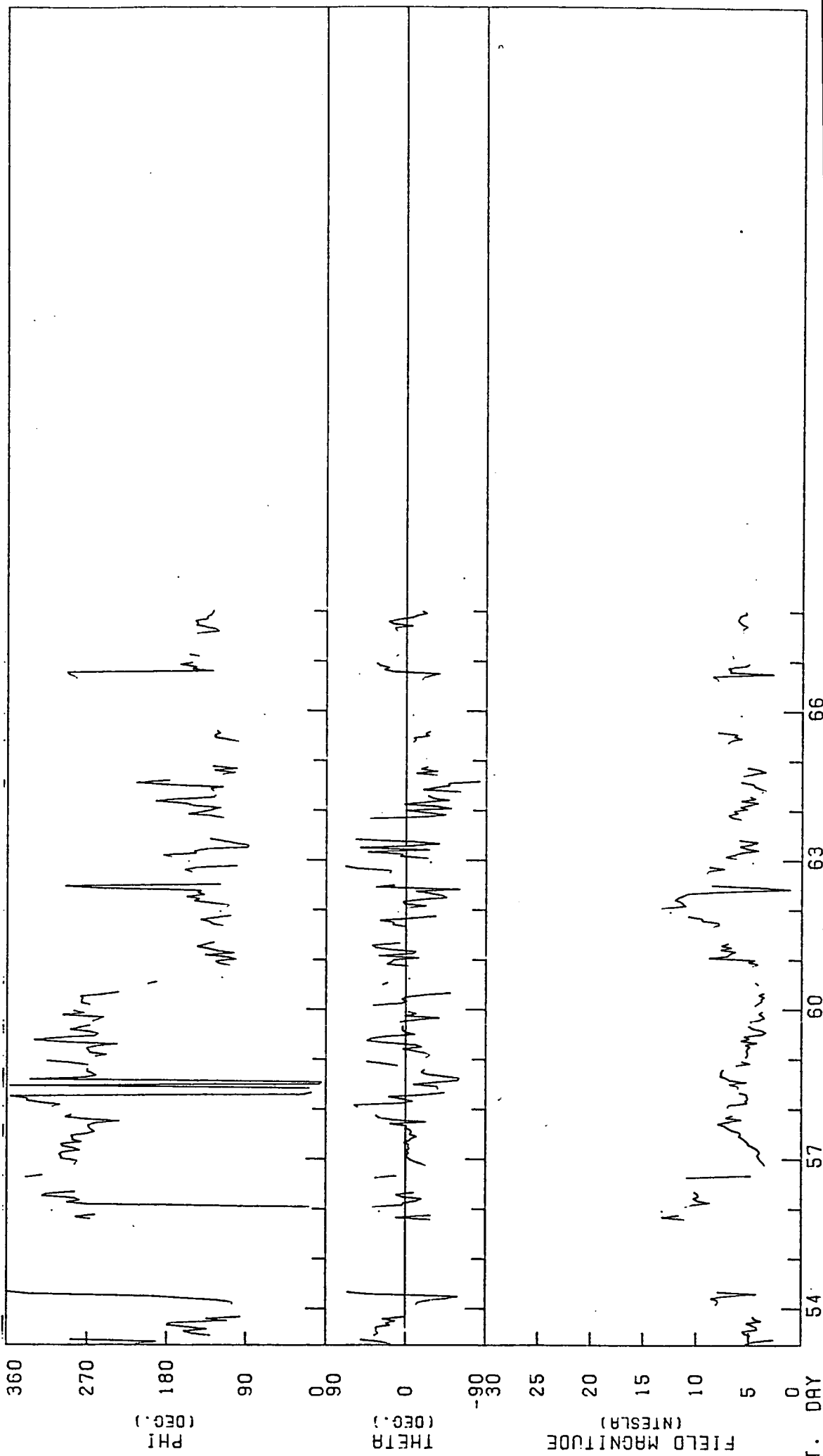
YEAR 1979

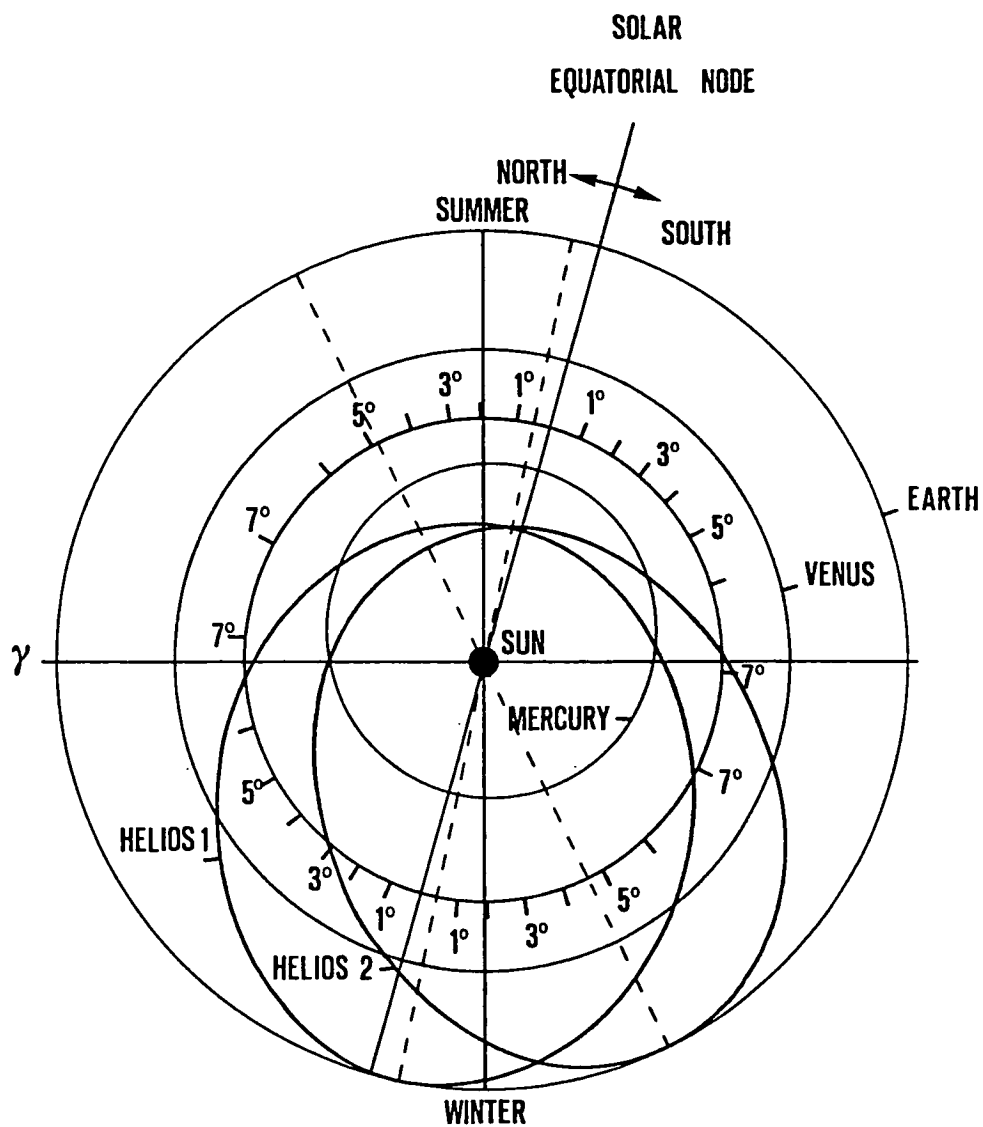




HELIOS 2 EXP 3 (HOURLY AVERAGES)

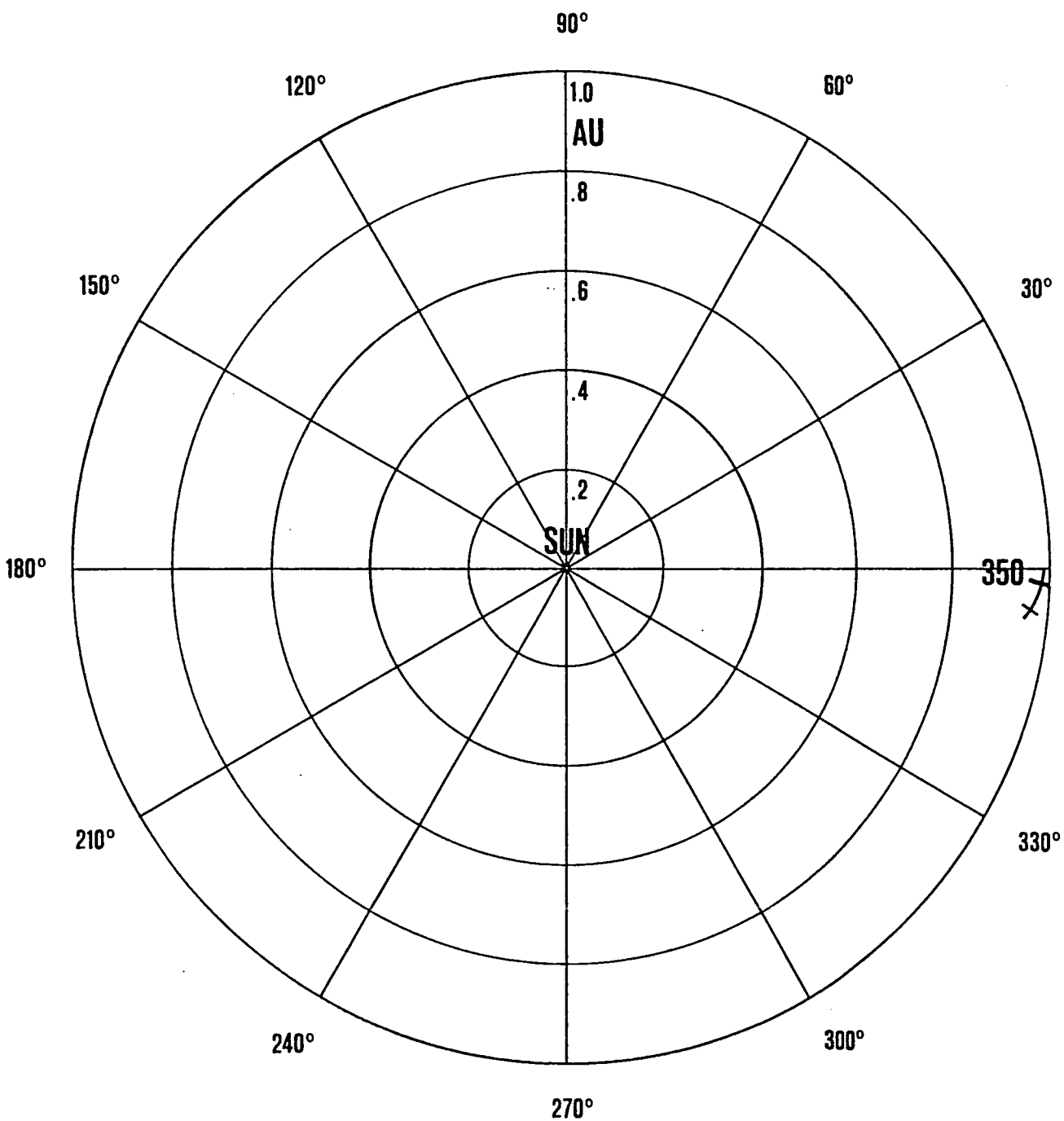
YEAR 1980



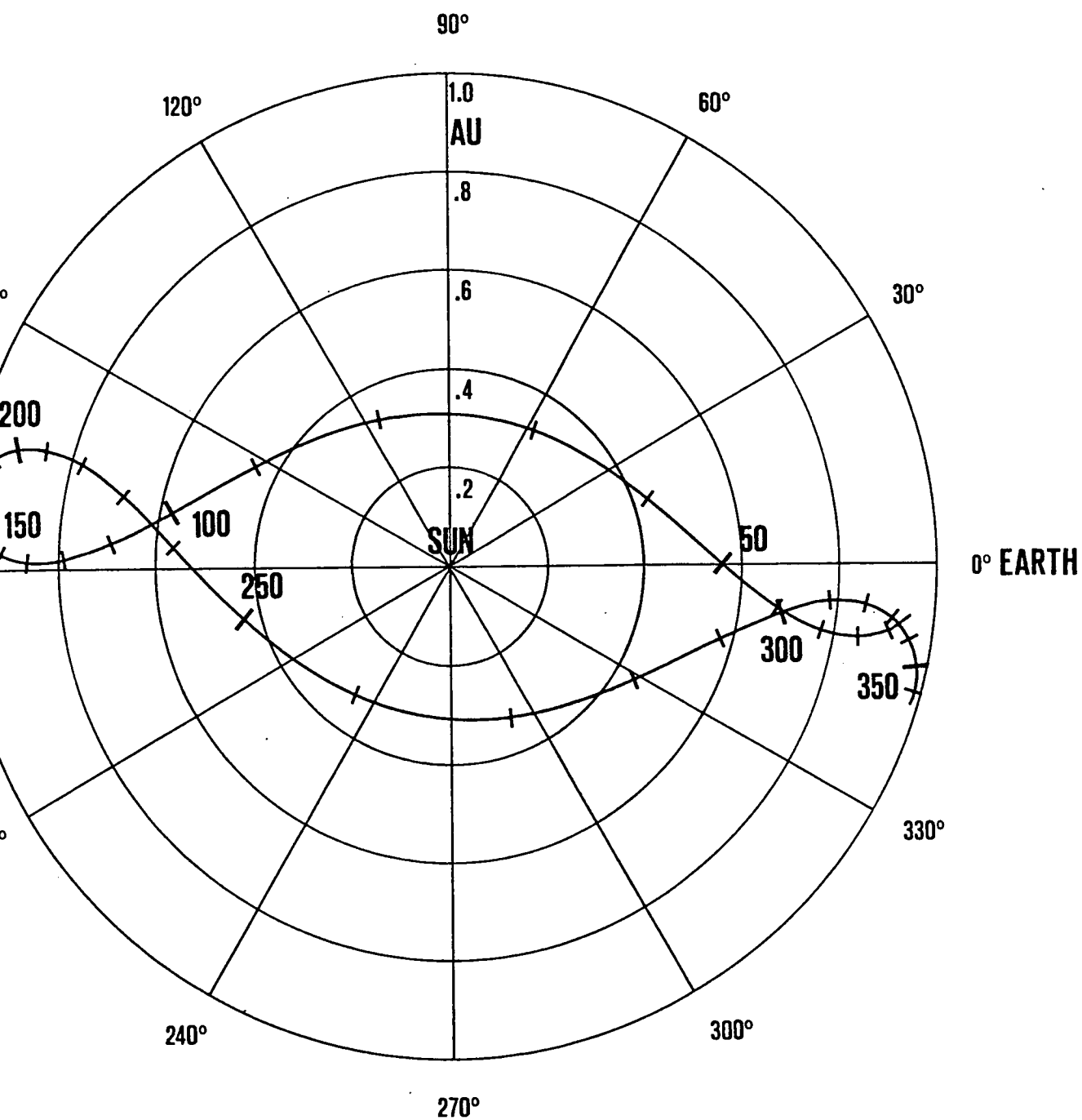


HELIOS 1 (LAUNCH DEC. 10, 1974)

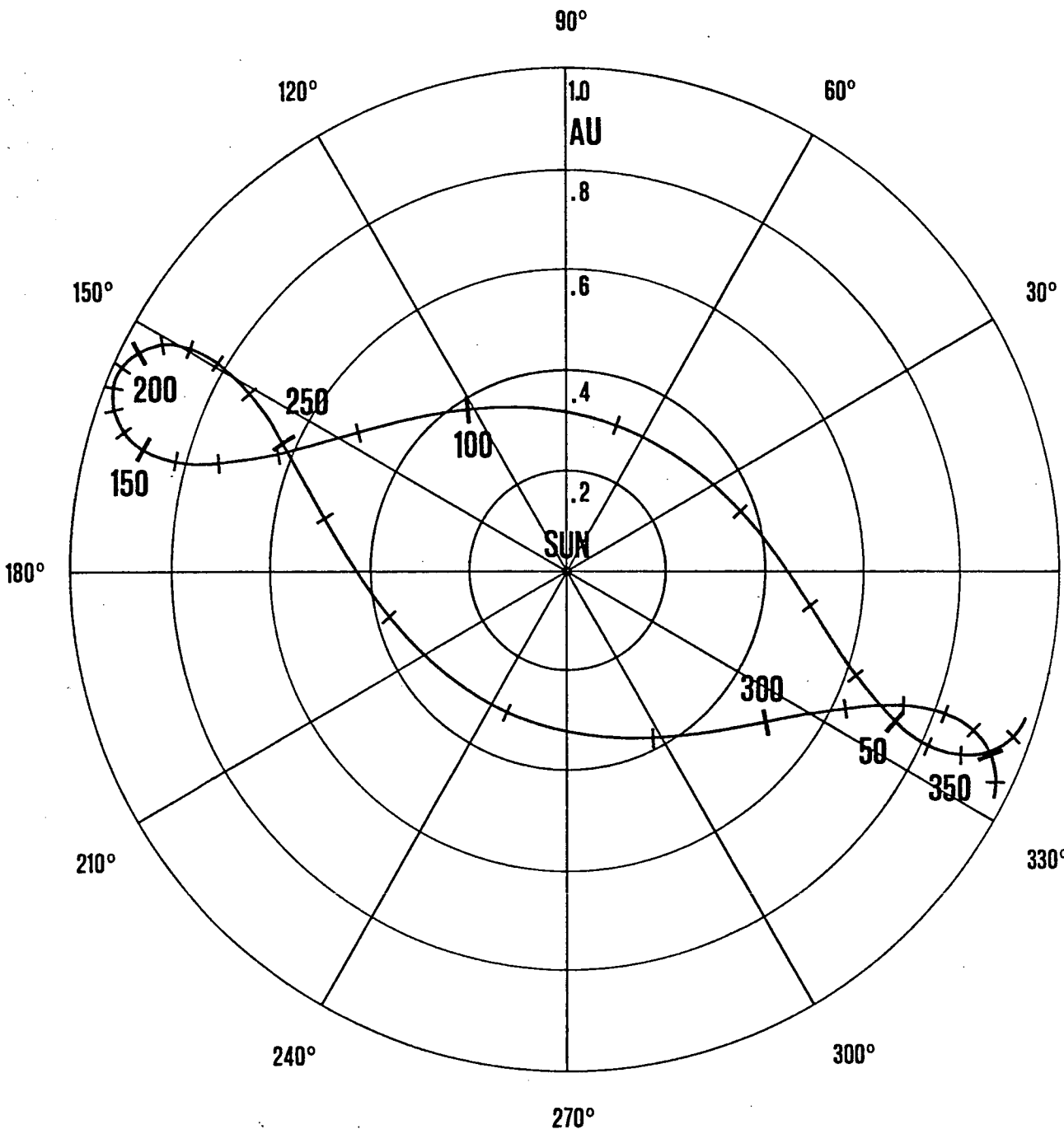
HELIOS 2 (LAUNCH JAN. 15, 1976)



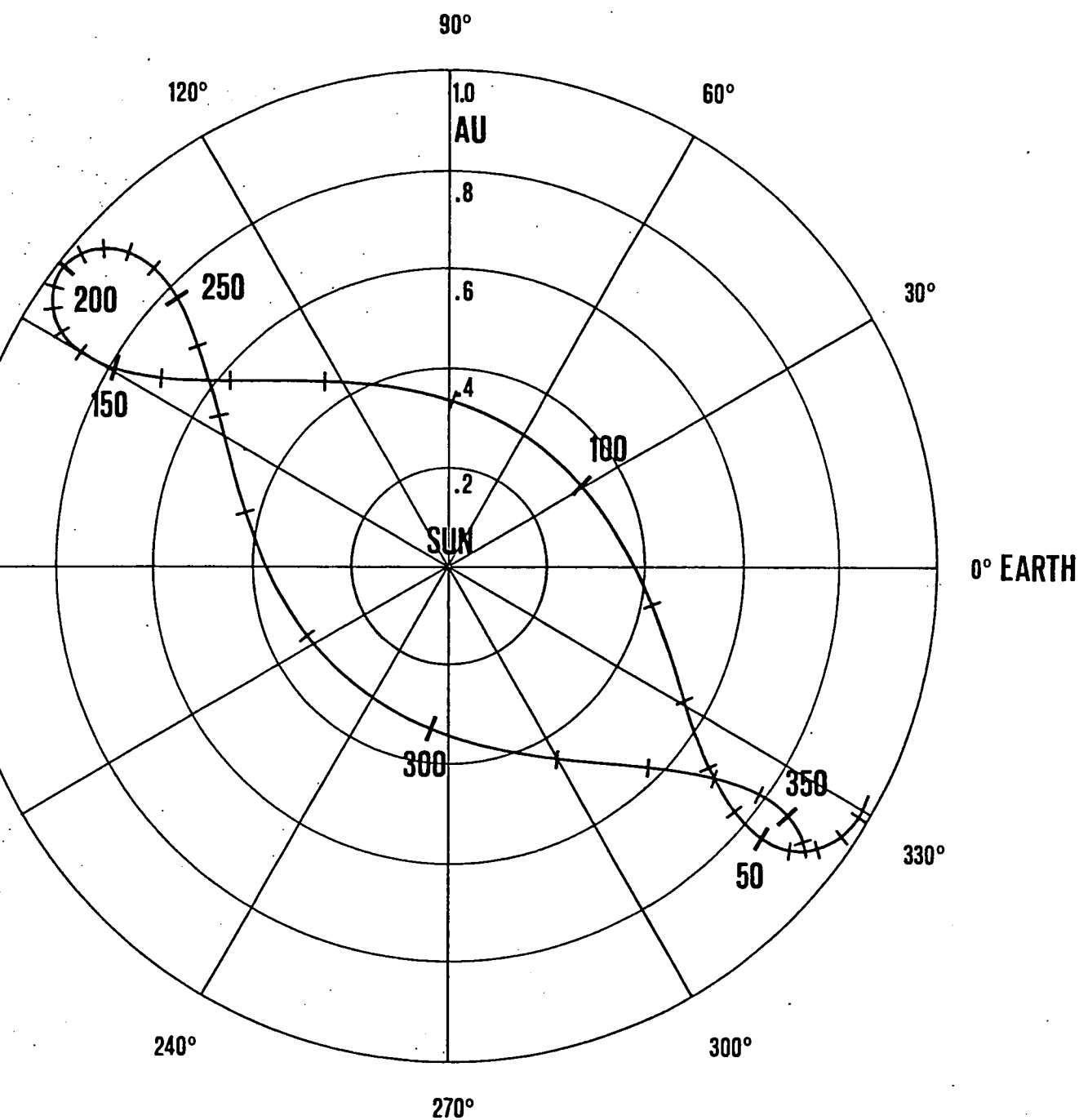
HELIOS-1 1974



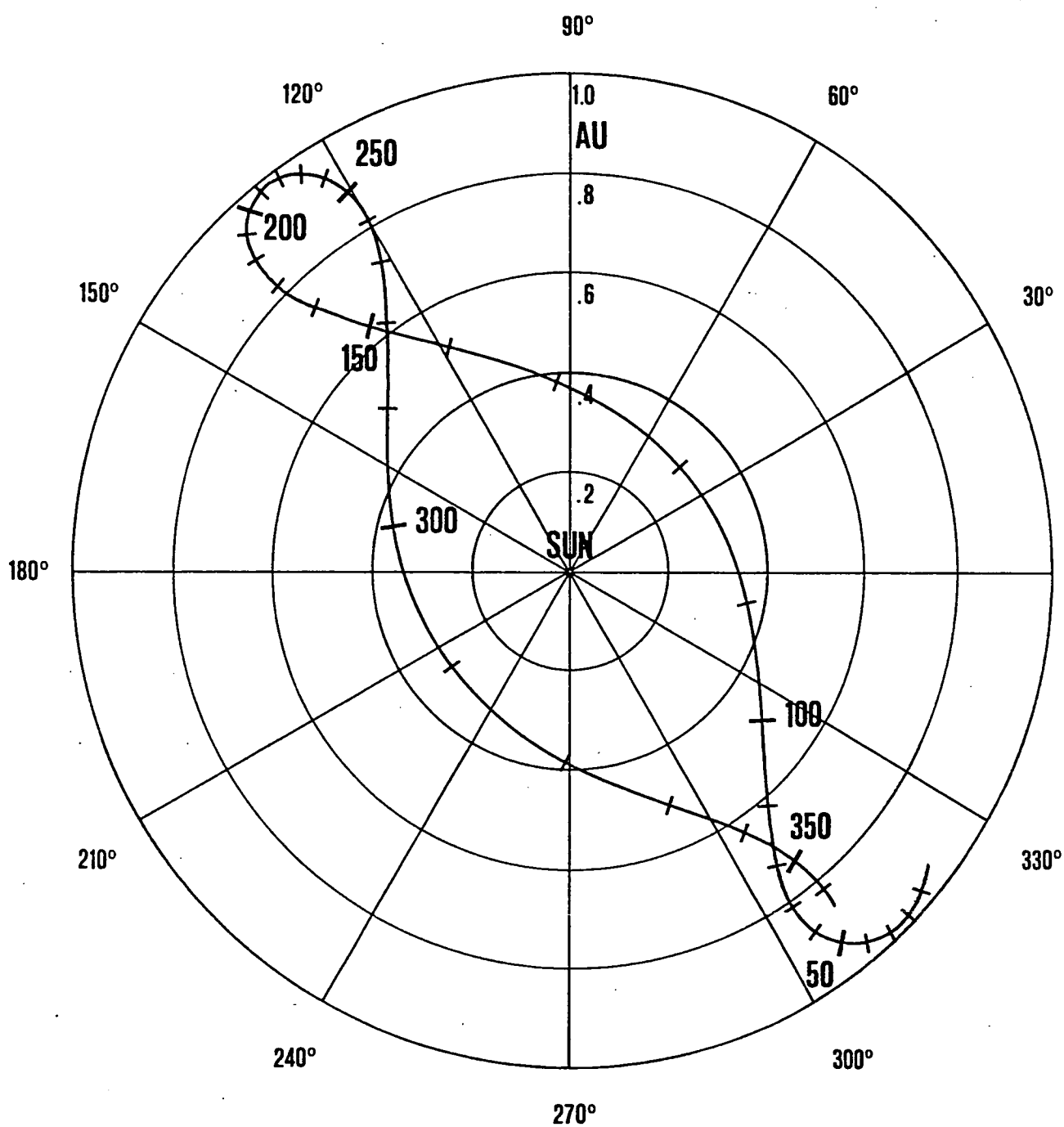
HELIOS-1 1975



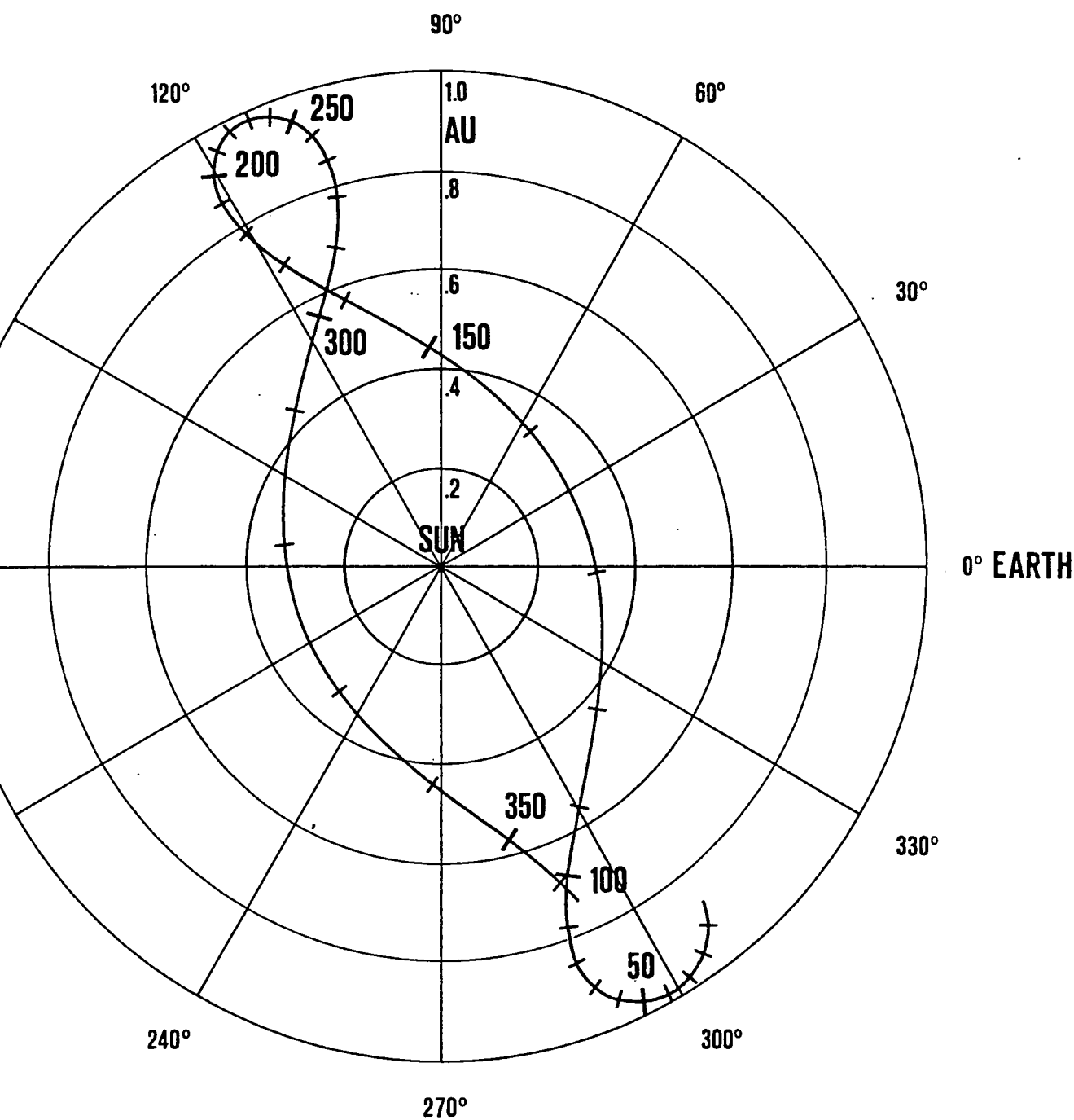
HELIOS-1 1976



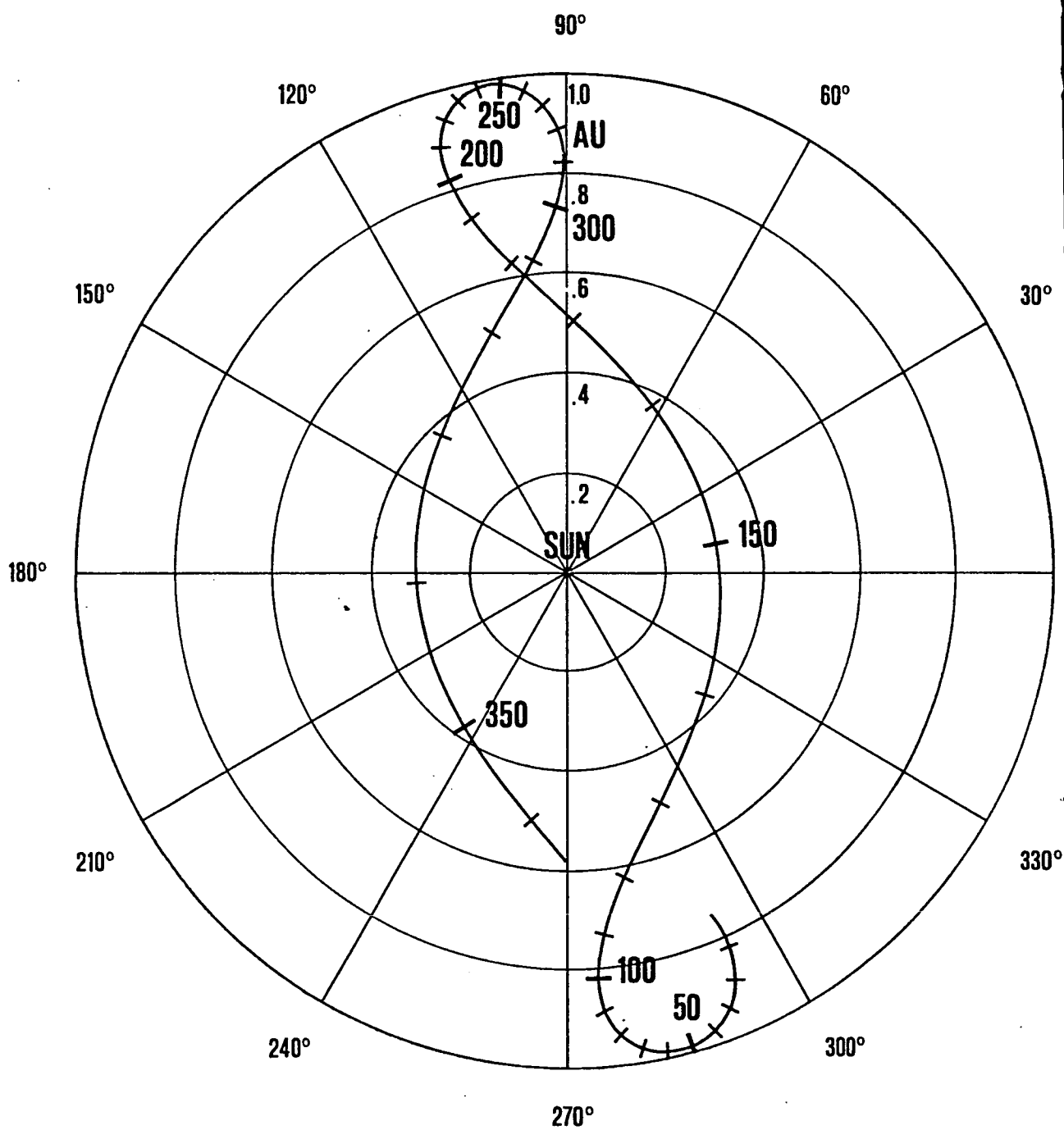
HELIOS-1 1977



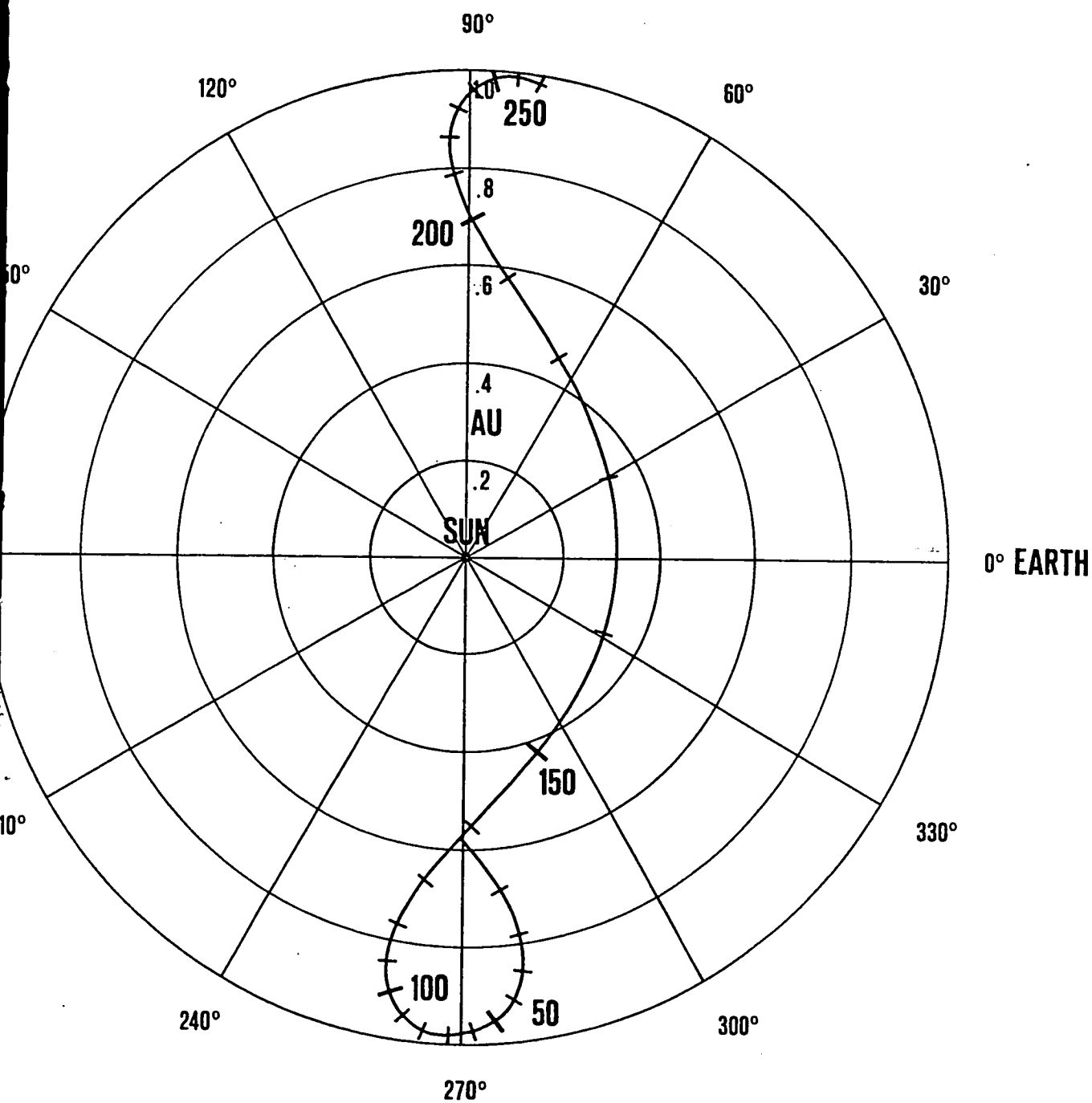
HELIOS-1 1978



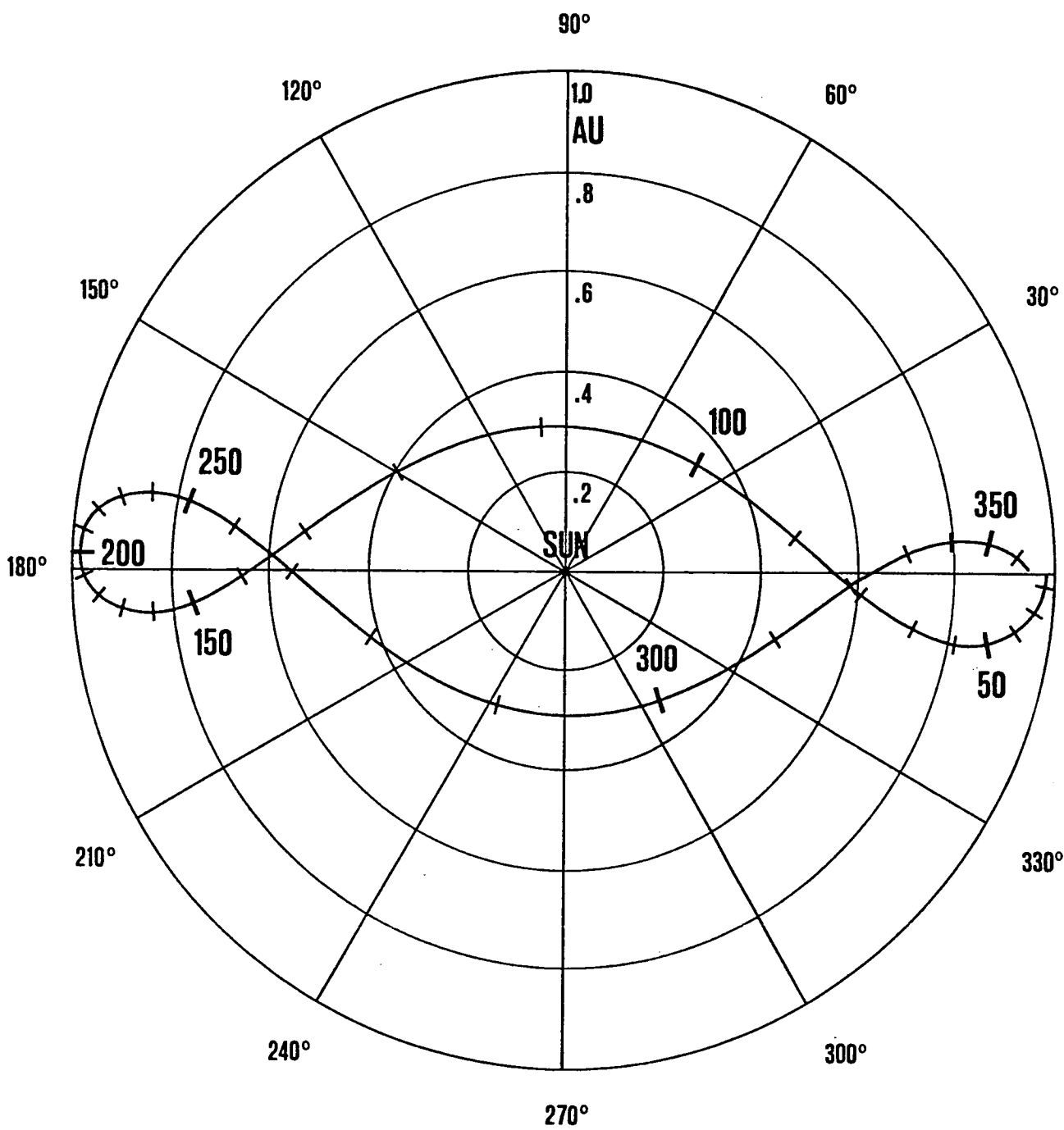
HELIOS-1 1979



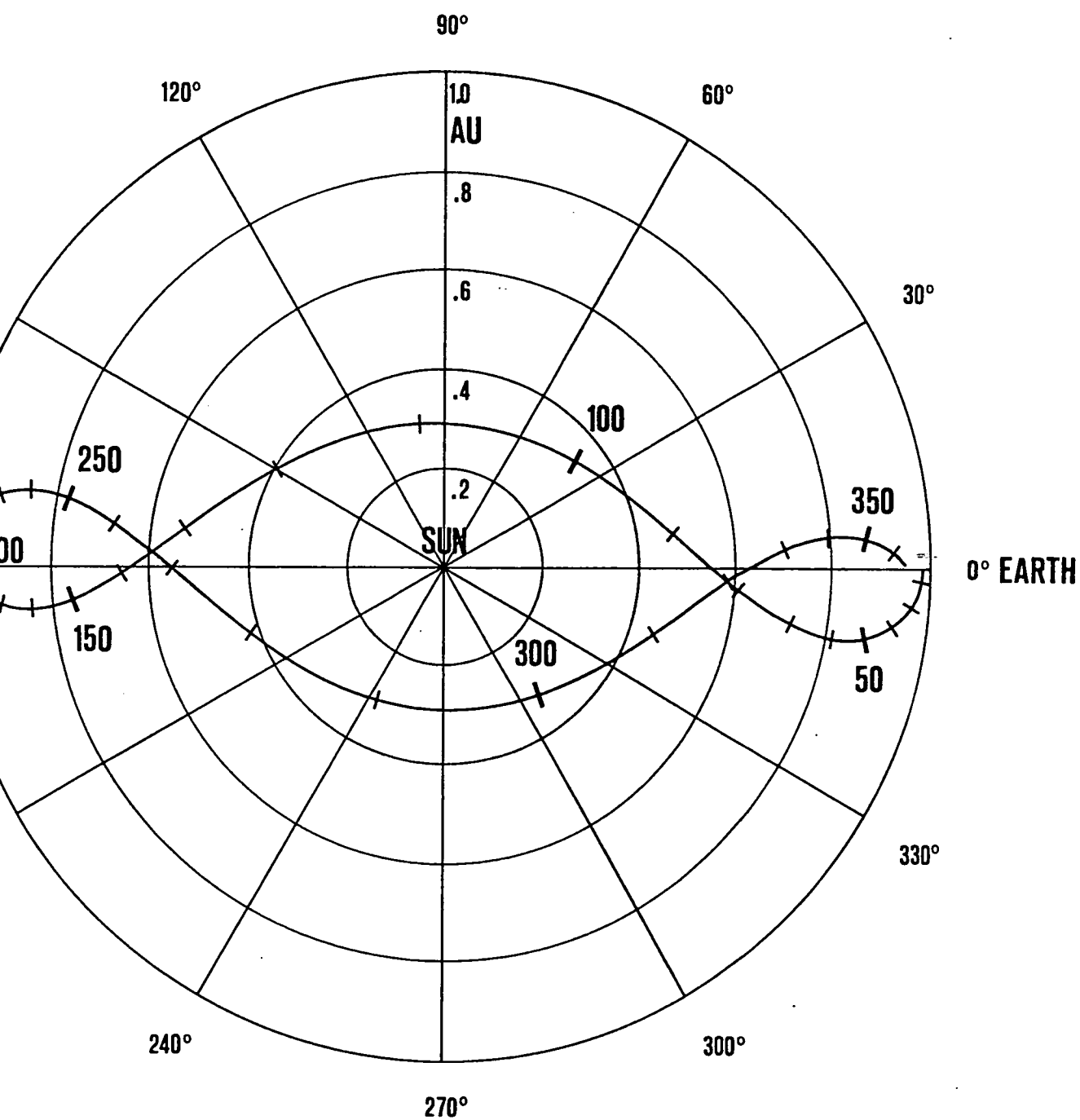
HELIOS-1 1980



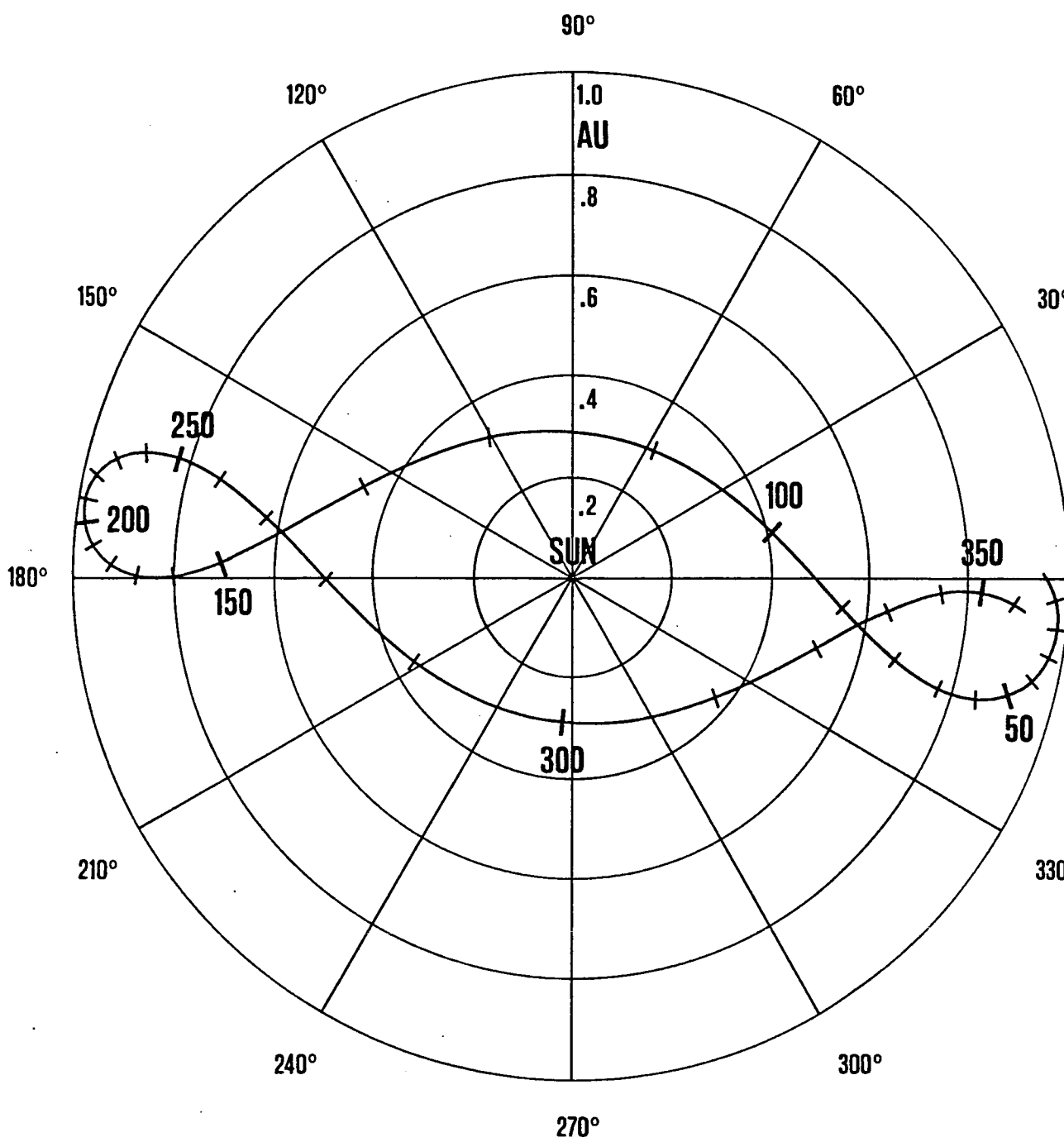
HELIOS-1 1981



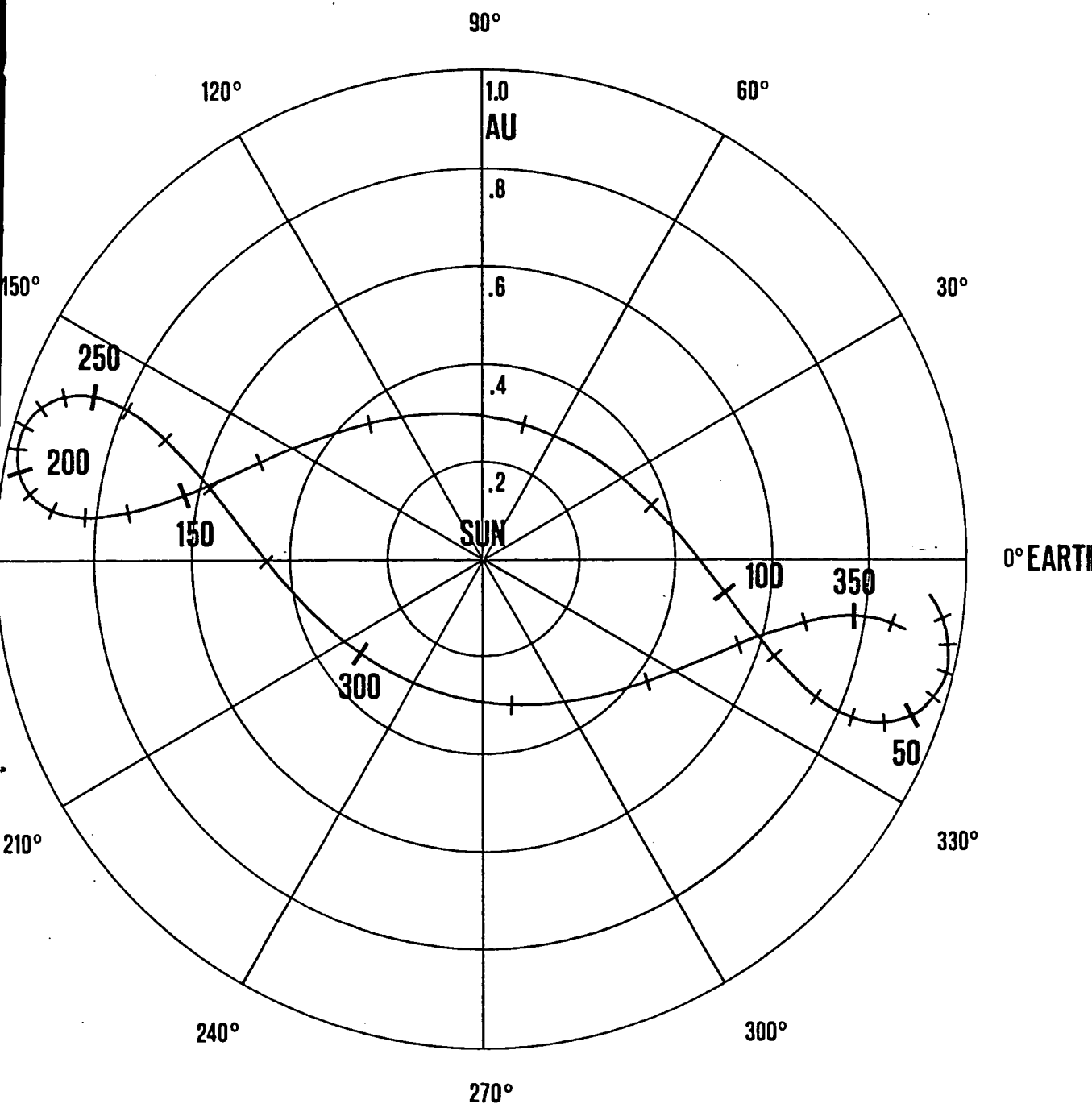
HELIOS-2 1976



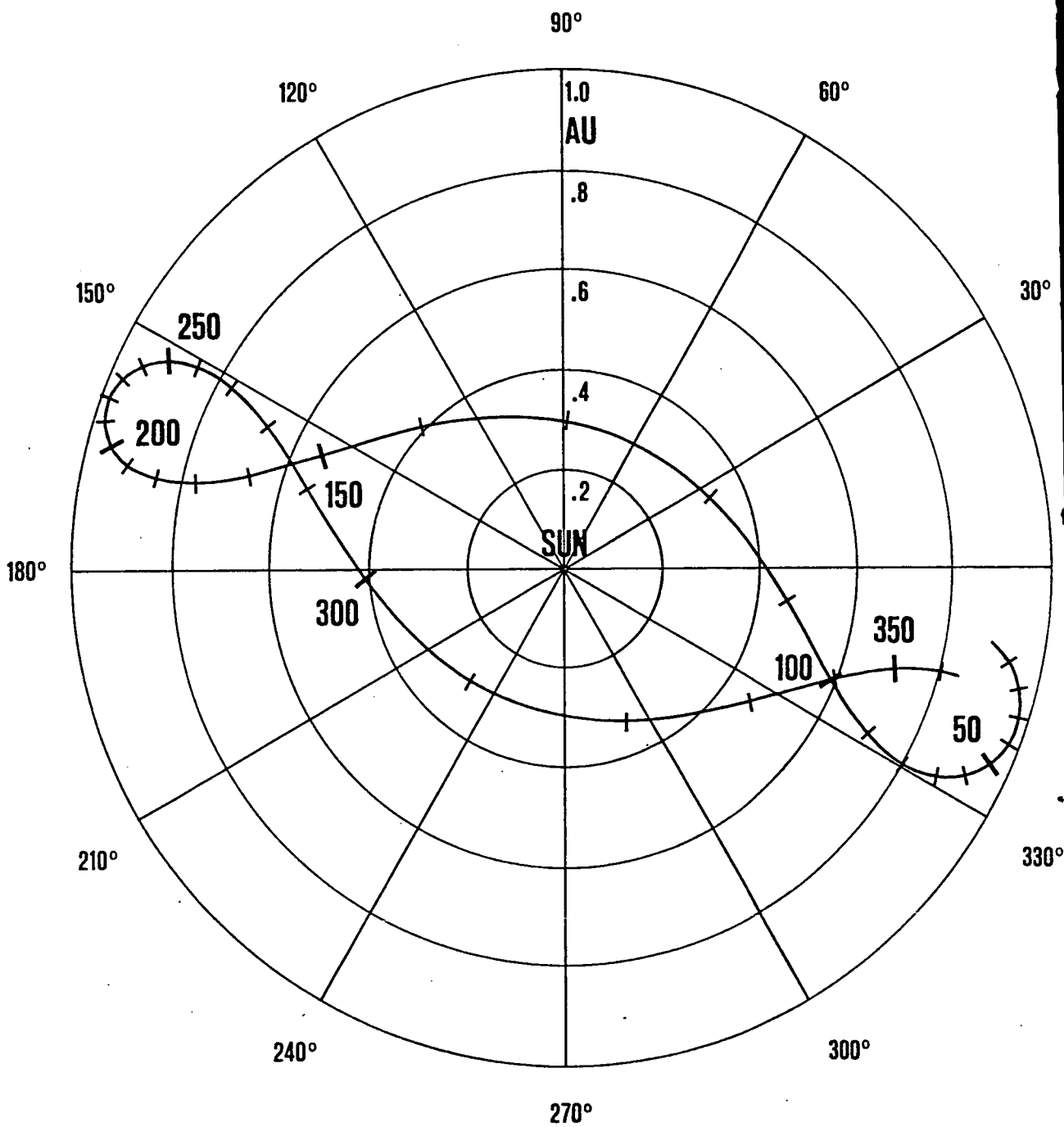
HELIOS-2 1976



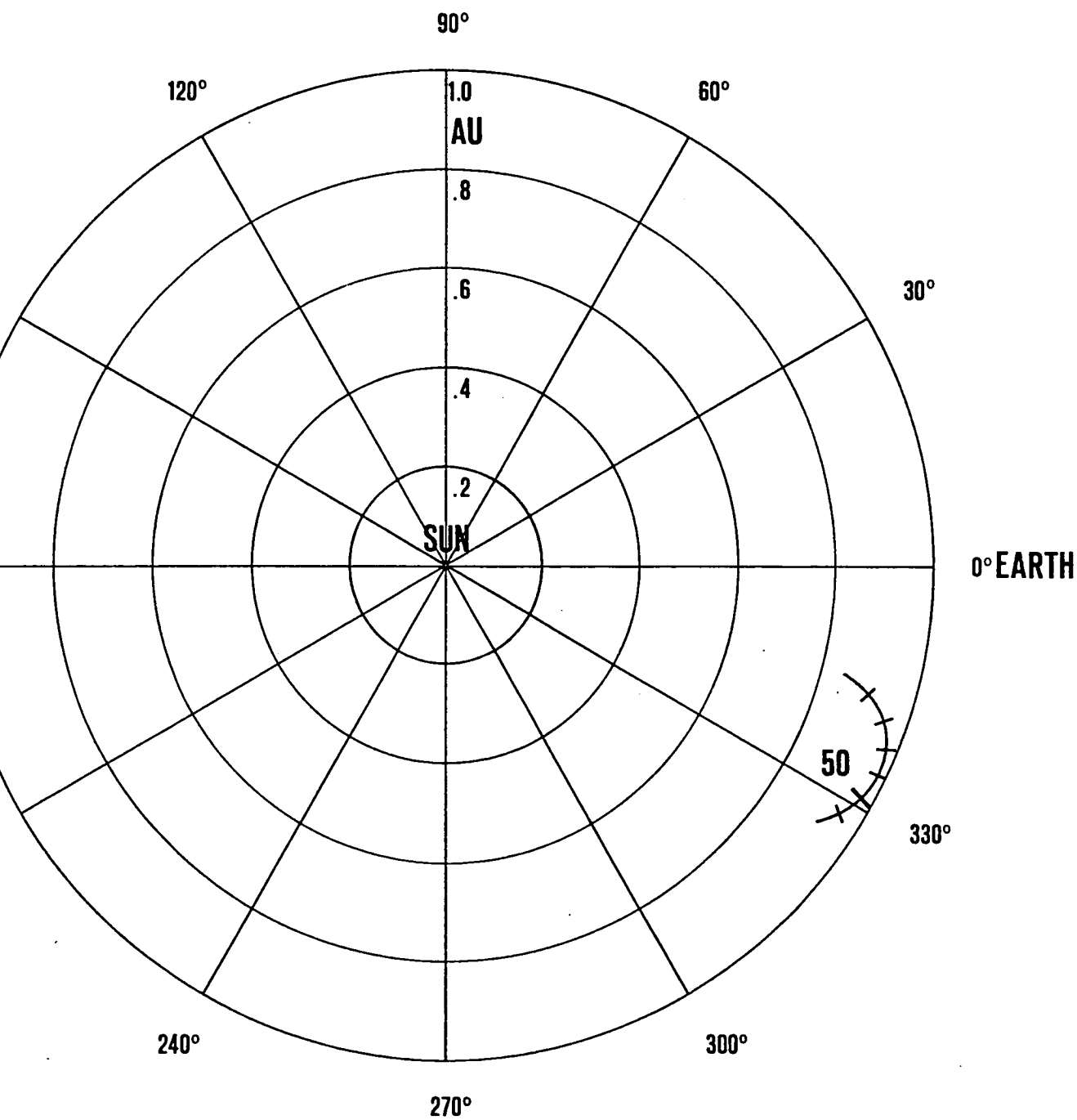
HELIOS-2 1977



HELIOS-2 1978



HELIOS-2 1979



HELIOS-2 1980